

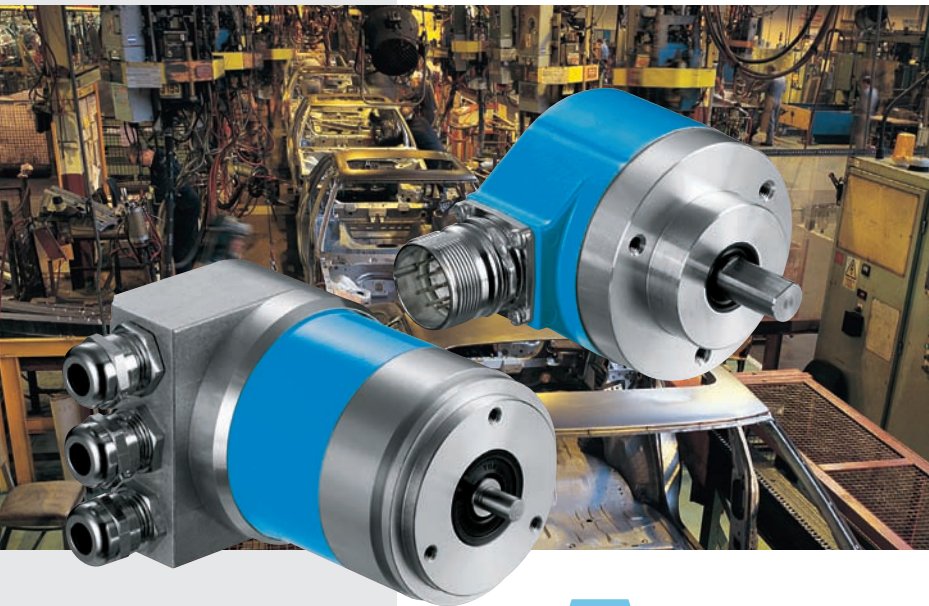


# Absolute Encoders Multiturn extremely robust and exceptionally reliable.

 **Resolution up to 26 bits**  
Absolute Encoder Multiturn

 **Number of steps 2 to 32.768**  
Absolut-Encoder Singleturn



With SSI or RS 422 configuration interface, Profibus, CANopen or DeviceNet field bus technology, all current interfaces suitable for the high requirements in automation technology are also available.

Whether with face mount flange, servo flange, blind or through hollow shaft with connector or cable outlet, the absolute encoders multiturn from SICK-STEGMANN will meet virtually any application profile.

**A**bsolute encoders from SICK-STEGMANN are provided in singleturn and multiturn.

All multiturn designs are implemented using mechanical gearboxes. These supply the revolution information very reliably and free from interference.

ARS60 absolute encoders singleturn are available with any desired number of steps between 2 and 32,768. The technology permits tailor-made solutions for every application, due to its modular design.

Thanks to this wide variety of products, there are numerous possible uses, for example in:

- machine tools
- textile machines
- woodworking machines
- packaging machines
- wind turbines

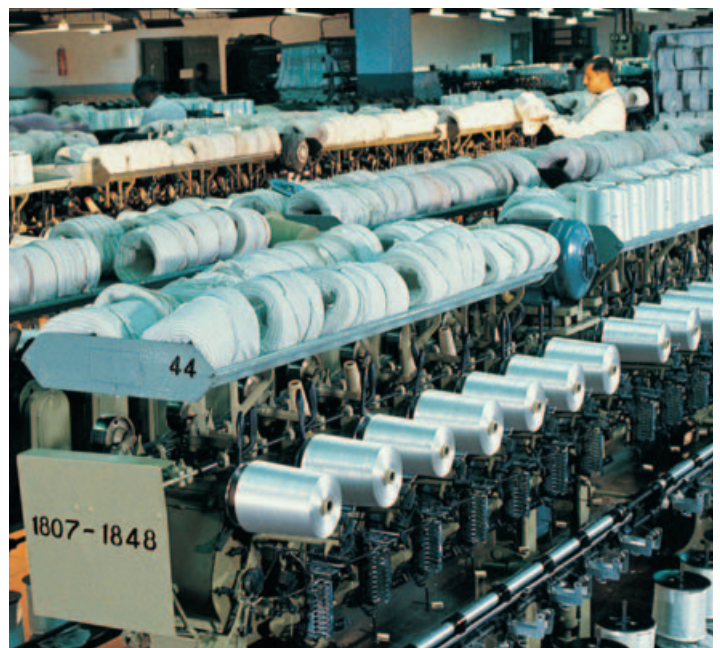




◀ Speed and absolute precision are prerequisite for success in the printing industry. This is where Absolute Multiturn Encoders come into their own.




▲ Efficient and always under control, Multiturn Encoders are essential for generating energy from alternative sources.



▲ It is no mean task to co-ordinate and monitor thousands of movements. Where every turn counts, Absolute Multiturn Encoders linked to essential bus systems are in their element.

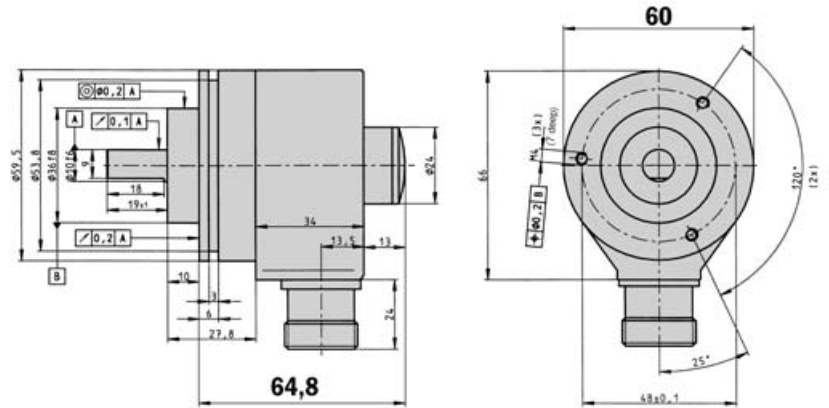
► Chemical engineering is all about flow. Valves control the flow of materials, and Absolute Encoders constantly provide the control system with essential feedback of valve positions.



 **Resolution up to 26 bits**  
Absolute Encoder Multiturn

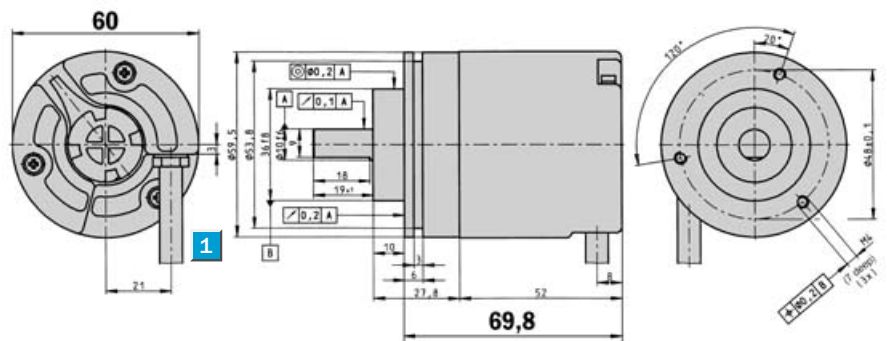
- Extremely robust
- SSI and RS 422 configuration interface
- Electronically adjustable, resolution adjustable
- Highly shock- and vibration-proof
- High degree of protection IP 67

## Dimensional drawing face mount flange, connector radial



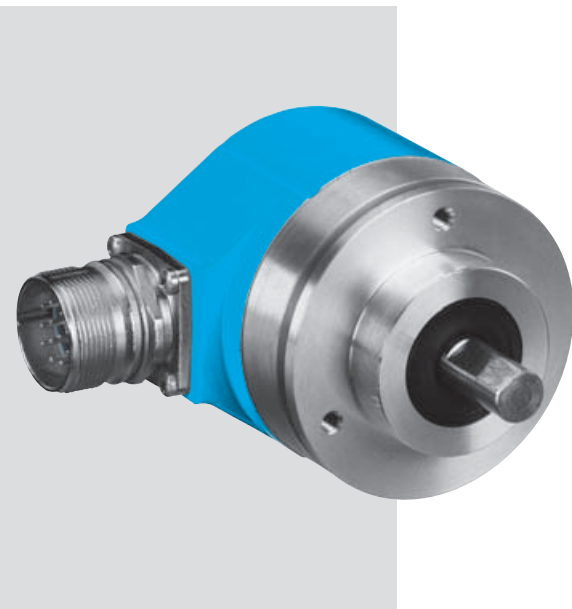
General tolerances according DIN ISO 2768-mk

## Dimensional drawing face mount flange, cable radial



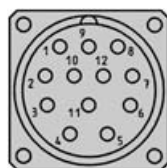
**1** = bending radius min. 40 mm

General tolerances according DIN ISO 2768-mk



## PIN and wire allocation

PIN	Signal	Wire colours (cable outlet)	Explanation
1	GND	blue	Earth connection
2	Data +	white	Signal line
3	Clock +	yellow	Signal line
4	R x D +	grey	RS 422 programming line
5	R x D -	green	RS 422 programming line
6	T x D +	pink	RS 422 programming line
7	T x D -	black	RS 422 programming line
8	U <sub>s</sub>	red	Supply voltage
9	SET	orange	Electronical adjustment
10	Data -	brown	Signal line
11	Clock -	lilac	Signal line
12	CW/CCW	orange/black	Counting sequence when turning
	Screen		Housing potential



View of the connector M23 fitted to the encoder body

**CW/CCW** Forward/reverse:  
This input programs the counting direction of the encoder. If not connected, this input is "HIGH". If the encoder shaft, as viewed on the drive shaft, rotates in the clockwise direction, it counts in an increasing sequence. If it should count upwards when the shaft rotates in the anti-clockwise direction, this connection must be connected permanently to "LOW" level (zero volts).

**SET** This input activates the electronic zero set.  
When the SET line is connected to U<sub>s</sub> for more than 100 ms, the current mechanical position is assigned the value 0 or the pre-programmed SET-value.



See chapter Accessories

Accessories for encoders



Technical data according to DIN 32878		ATM 60 SSI	Flange type							
			face m.							
<b>Solid shaft</b>	10 mm									
<b>Mass <sup>1)</sup></b>	Approx. 0.5 kg									
<b>Moment of inertia of the rotor</b>	35 gcm <sup>2</sup>									
<b>Programmable code type</b>	Gray/binary									
<b>Programmable code direction</b>	CW/CCW									
<b>Measuring step</b>	0.043°									
<b>Max. number of steps per revolution</b>	8,192									
<b>Max. number of revolutions</b>	8,192									
<b>Error limits</b>	± 0.25°									
<b>Repeatability</b>	0.1°									
<b>Operating speed</b>	6,000 min <sup>-1</sup>									
<b>Position forming time</b>	0.15 ms									
<b>Max. angular acceleration</b>	5 x 10 <sup>5</sup> rad/s <sup>2</sup>									
<b>Operating torque</b>										
with shaft seal	1.8 Ncm									
without shaft seal <sup>2)</sup>	0.3 Ncm									
<b>Start up torque</b>										
with shaft seal	2.5 Ncm									
without shaft seal <sup>2)</sup>	0.5 Ncm									
<b>Max. shaft loading</b>										
radial	300 N									
axial	50 N									
<b>Bearing lifetime</b>	3.6 x 10 <sup>9</sup> revolutions									
<b>Working temperature range</b>	- 20 ... + 85 °C									
<b>Storage temperature range</b>	- 40 ... + 100 °C									
<b>Permissible relative humidity</b>	98 %									
<b>EMC <sup>3)</sup></b>										
<b>Resistance</b>										
to shocks <sup>4)</sup>	100/6 g/ms									
to vibration <sup>5)</sup>	20/10 ... 2000 g/Hz									
<b>Protection class acc. IEC 60529</b>										
with shaft seal	IP 67									
without shaft seal <sup>6)</sup>	IP 43									
without shaft seal <sup>7)</sup>	IP 65									
<b>Operating voltage range (Us)</b>	10 ... 32 V									
<b>Power consumption</b>	0.8 W									
<b>Initialisation time <sup>8)</sup></b>	1050 ms									
<b>Signals <sup>9)</sup></b>										
<b>Interface signals</b>										
Clock +, Clock -, Data +, Data - <sup>10)</sup>	SSI max. clock frequency 1 MHz i.e. min. duration of low level (clock +): 500 ns									
T x D +, T x D -, R x D +, R x D -	RS 422									
SET (electronic adjustment)	H-active (L ≙ 0 - 4.7 V; H ≙ 10 - Us V)									
CW/CCW (steps sequence in direction of rotation)	L-active (L ≙ 0 - 1.5 V; H ≙ 2.0 - Us V)									

<sup>1)</sup> For an encoder with connector outlet

<sup>2)</sup> If the shaft seal has been removed by the customer

<sup>3)</sup> To DIN EN 61000-6-2 and DIN EN 61000-6-3

<sup>4)</sup> To DIN EN 60068-2-27

<sup>5)</sup> To DIN EN 60068-2-6

<sup>6)</sup> On encoder flange not sealed

<sup>7)</sup> On encoder flange sealed

<sup>8)</sup> From the moment the supply voltage is applied, this is the time which elapses before the data word can be correctly read in

<sup>9)</sup> Carried by 12 way connector, potential-free with respect to housing, or 12 core cable

<sup>10)</sup> For higher clock frequencies, choose synchronous SSI


#### Order information

##### ATM 60 face mount flange solid shaft; Us 10 ... 32 V; SSI

##### 1 Configuration ex-works: 4,096 steps x 4,096 revolutions, Gray-Code, Set = 0

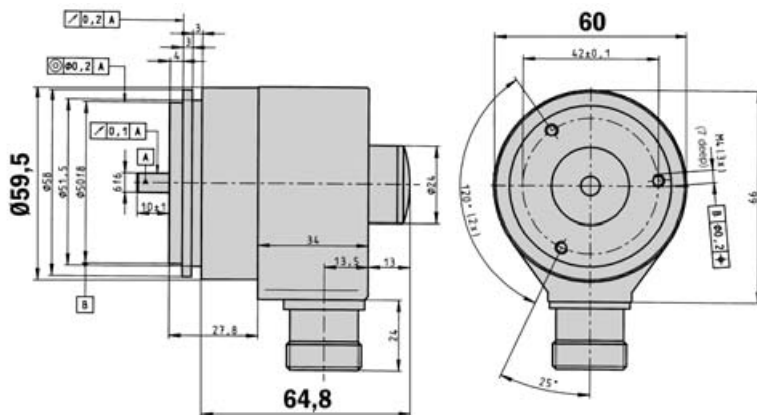
Type	Part no.	Explanation
ATM60-A4A12X12	1 030 001	Connector M23, 12 pin
ATM60-A4K12X12	1 030 002	Cable 1.5 m
ATM60-A4L12X12	1 030 003	Cable 3 m
ATM60-A4M12X12	1 030 004	Cable 5 m
ATM60-A4N12X12	1 032 915	Cable 10 m

##### 1 Other configurations on request

 **Resolution up to 26 bits**  
Absolute Encoder Multiturn

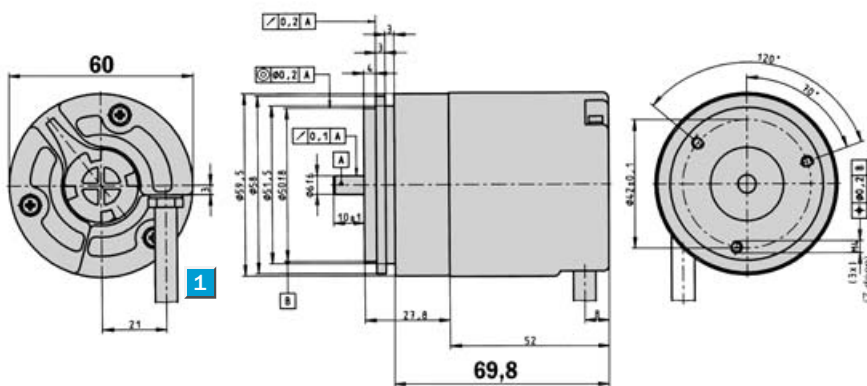
- Extremely robust
- SSI and RS 422 configuration interface
- Electronically adjustable, resolution adjustable
- Highly shock- and vibration-proof
- High degree of protection IP 67

### Dimensional drawing servo flange, connector radial



General tolerances according DIN ISO 2768-mk

### Dimensional drawing servo flange, cable radial



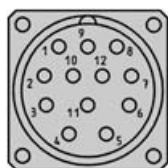
**1** = bending radius min. 40 mm

General tolerances according DIN ISO 2768-mk



### PIN and wire allocation

PIN	Signal	Wire colours (cable outlet)	Explanation
1	GND	blue	Earth connection
2	Data +	white	Signal line
3	Clock +	yellow	Signal line
4	R x D +	grey	RS 422 programming line
5	R x D -	green	RS 422 programming line
6	T x D +	pink	RS 422 programming line
7	T x D -	black	RS 422 programming line
8	U <sub>s</sub>	red	Supply voltage
9	SET	orange	Electronical adjustable
10	Data -	brown	Signal line
11	Clock -	lilac	Signal line
12	CW/CCW	orange/black	Counting sequence when turning
	Screen		Housing potential



View of the connector M23 fitted to the encoder body

**CW/CCW** Forward/reverse:  
This input programs the counting direction of the encoder. If not connected, this input is "HIGH". If the encoder shaft, as viewed on the drive shaft, rotates in the clockwise direction, it counts in an increasing sequence. If it should count upwards when the shaft rotates in the anti-clockwise direction, this connection must be connected permanently to "LOW" level (zero volts).

**SET** This input activates the electronic zero set.  
When the SET line is connected to U<sub>s</sub> for more than 100 ms, the current mechanical position is assigned the value 0 or the pre-programmed SET-value.



See chapter Accessories

Accessories for encoders

Technical data according to DIN 32878		ATM 60 SSI	Flange type							
			servo							
<b>Solid shaft</b>	6 mm									
<b>Mass <sup>1)</sup></b>	Approx. 0.5 kg									
<b>Moment of inertia of the rotor</b>	35 gcm <sup>2</sup>									
<b>Programmable code type</b>	Gray/binary									
<b>Programmable code direction</b>	CW/CCW									
<b>Measuring step</b>	0.043°									
<b>Max. number of steps per revolution</b>	8,192									
<b>Max. number of revolutions</b>	8,192									
<b>Error limits</b>	± 0.25°									
<b>Repeatability</b>	0.1°									
<b>Operating speed</b>	6,000 min <sup>-1</sup>									
<b>Position forming time</b>	0.15 ms									
<b>Max. angular acceleration</b>	5 x 10 <sup>5</sup> rad/s <sup>2</sup>									
<b>Operating torque</b>										
with shaft seal	1.8 Ncm									
without shaft seal <sup>2)</sup>	0.3 Ncm									
<b>Start up torque</b>										
with shaft seal	2.5 Ncm									
without shaft seal <sup>2)</sup>	0.5 Ncm									
<b>Max. shaft loading</b>										
radial	300 N									
axial	50 N									
<b>Bearing lifetime</b>	3.6 x 10 <sup>9</sup> revolutions									
<b>Working temperature range</b>	- 20 ... + 85 °C									
<b>Storage temperature range</b>	- 40 ... + 100 °C									
<b>Permissible relative humidity</b>	98 %									
<b>EMC <sup>3)</sup></b>										
<b>Resistance</b>										
to shocks <sup>4)</sup>	100/6 g/ms									
to vibration <sup>5)</sup>	20/10 ... 2000 g/Hz									
<b>Protection class acc. IEC 60529</b>										
with shaft seal	IP 67									
without shaft seal <sup>6)</sup>	IP 43									
without shaft seal <sup>7)</sup>	IP 65									
<b>Operating voltage range (Us)</b>	10 ... 32 V									
<b>Power consumption</b>	0.8 W									
<b>Initialisation time <sup>8)</sup></b>	1050 ms									
<b>Signals <sup>9)</sup></b>										
<b>Interface signals</b>										
Clock +, Clock -, Data +, Data - <sup>10)</sup>	SSI max. clock frequency 1 MHz i.e. min. duration of low level (clock +): 500 ns									
T x D +, T x D -, R x D +, R x D -	RS 422									
SET (electronic adjustment)	H-active (L ≙ 0 - 4.7 V; H ≙ 10 - U <sub>s</sub> V)									
CW/CCW (steps sequence in direction of rotation)	L-active (L ≙ 0 - 1.5 V; H ≙ 2.0 - U <sub>s</sub> V)									

<sup>1)</sup> For an encoder with connector outlet

<sup>2)</sup> If the shaft seal has been removed by the customer

<sup>3)</sup> To DIN EN 61000-6-2 and DIN EN 61000-6-3

<sup>4)</sup> To DIN EN 60068-2-27

<sup>5)</sup> To DIN EN 60068-2-6

<sup>6)</sup> On encoder flange not sealed

<sup>7)</sup> On encoder flange sealed

<sup>8)</sup> From the moment the supply voltage is applied, this is the time which elapses before the data word can be correctly read in

<sup>9)</sup> Carried by 12 way connector, potential-free with respect to housing, or 12 core cable

<sup>10)</sup> For higher clock frequencies, choose synchronous SSI


#### Order information

##### ATM 60 servo flange solid shaft; U<sub>s</sub> 10 ... 32 V; SSI

##### 1 Configuration ex-works: 4,096 steps x 4,096 revolutions, Gray-Code, Set = 0

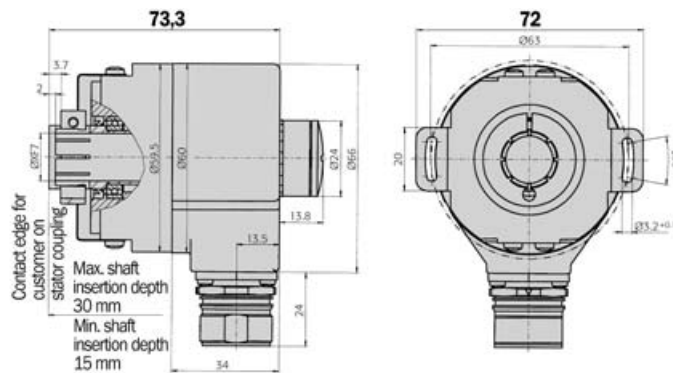
Type	Part no.	Explanation
ATM60-A1A12X12	1 030 005	Connector M23, 12 pin
ATM60-A1K12X12	1 030 006	Cable 1.5 m
ATM60-A1L12X12	1 030 007	Cable 3 m
ATM60-A1M12X12	1 030 008	Cable 5 m
ATM60-A1N12X12	1 032 925	Cable 10 m

##### 1 Other configurations on request

 **Resolution up to 26 bits**  
Absolute Encoder Multiturn

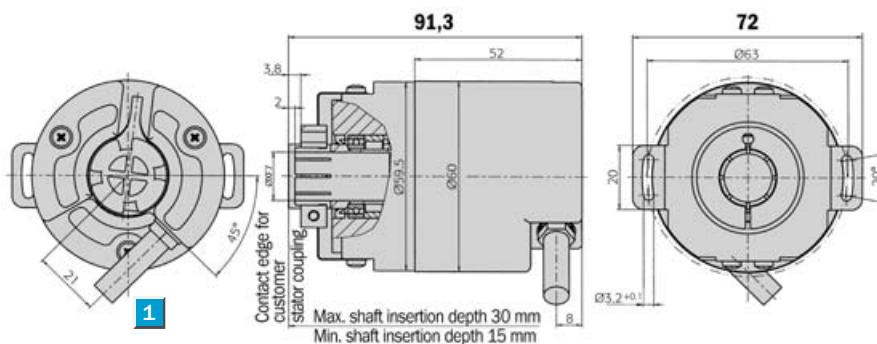
- Extremely robust
- SSI and RS 422 configuration interface
- Electronically adjustable, resolution adjustable
- Highly shock- and vibration-proof
- High degree of protection IP 67

### Dimensional drawing blind hollow shaft, connector radial



General tolerances according DIN ISO 2768-mk

### Dimensional drawing blind hollow shaft, cable radial



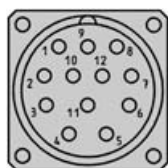
**1** = bending radius min. 40 mm

General tolerances according DIN ISO 2768-mk



### PIN and wire allocation

PIN	Signal	Wire colours (cable outlet)	Explanation
1	GND	blue	Earth connection
2	Data +	white	Signal line
3	Clock +	yellow	Signal line
4	R x D +	grey	RS 422 programming line
5	R x D -	green	RS 422 programming line
6	T x D +	pink	RS 422 programming line
7	T x D -	black	RS 422 programming line
8	U <sub>s</sub>	red	Supply voltage
9	SET	orange	Electronical adjustment
10	Data -	brown	Signal line
11	Clock -	lilac	Signal line
12	CW/CCW	orange/black	Counting sequence when turning
	Screen		Housing potential



View of the connector M23 fitted to the encoder body

**CW/CCW** Forward/reverse:  
This input programs the counting direction of the encoder. If not connected, this input is "HIGH". If the encoder shaft, as viewed on the drive shaft, rotates in the clockwise direction, it counts in an increasing sequence. If it should count upwards when the shaft rotates in the anti-clockwise direction, this connection must be connected permanently to "LOW" level (zero volts).

**SET** This input activates the electronic zero set.  
When the SET line is connected to U<sub>s</sub> for more than 100 ms, the current mechanical position is assigned the value 0 or the pre-programmed SET-value.

**See chapter Accessories**  
Accessories for encoders



Technical data according to DIN 32878		ATM 60 SSI	Flange type						
			blind						
<b>1</b> Hollow shaft diameter	6, 8, 10, 12, 15 mm, 1/4", 3/8", 1/2"								
Mass <sup>1)</sup>	Approx. 0.4 kg								
Moment of inertia of the rotor	55 gcm <sup>2</sup>								
Programmable code type	Gray/binary								
Programmable code direction	CW/CCW								
Measuring step	0.043°								
Max. number of steps per revolution	8,192								
Max. number of revolutions	8,192								
Error limits	± 0.25°								
Repeatability	0.1°								
Operating speed	3,000 min <sup>-1</sup>								
Position forming time	0.15 ms								
Max. angular acceleration	5 x 10 <sup>5</sup> rad/s <sup>2</sup>								
Operating torque	0.8 Ncm <sup>2)</sup>								
Start up torque	1.2 Ncm <sup>2)</sup>								
<b>Permissible shaft movement of the drive element</b>									
radial static/dynamic	± 0.3/± 0.1 mm								
axial static/dynamic	± 0.5/± 0.2 mm								
Bearing lifetime	3.6 x 10 <sup>9</sup> revolutions								
Working temperature range	- 20 ... + 85 °C								
Storage temperature range	- 40 ... + 100 °C								
Permissible relative humidity	98 %								
<b>EMC <sup>3)</sup></b>									
<b>Resistance</b>									
to shocks <sup>4)</sup>	100/6 g/ms								
to vibration <sup>5)</sup>	20/10 ... 2000 g/Hz								
Protection class acc. IEC 60529 <sup>2)</sup>	IP 67								
without shaft seal <sup>6)</sup>	IP 43								
Operating voltage range (Us)	10 ... 32 V								
Power consumption	0.8 W								
Initialisation time <sup>7)</sup>	1050 ms								
<b>Signals <sup>8)</sup></b>									
<b>Interface signals</b>									
Clock +, Clock -, Data +, Data - <sup>9)</sup>	SSI max. clock frequency 1 MHz i.e. min. duration of low level (clock +): 500 ns								
T x D +, T x D -, R x D +, R x D -	RS 422								
SET (electronic adjustment)	H-active (L ± 0 - 4.7 V; H ± 10 - Us V)								
CW/CCW <sup>10)</sup>	L-active (L ± 0 - 1.5 V; H ± 2.0 - Us V)								

<sup>1)</sup> For an encoder with connector outlet

<sup>2)</sup> With shaft seal

<sup>3)</sup> To DIN EN 61000-6-2 and DIN EN 61000-6-3

<sup>4)</sup> To DIN EN 60068-2-27

<sup>5)</sup> To DIN EN 60068-2-6

<sup>6)</sup> On encoder flange not sealed

<sup>7)</sup> From the moment the supply voltage is applied, this is the time which elapses before the data word can be correctly read in.

<sup>8)</sup> Carried by 12 way connector, potential-free with respect to housing, or 12 core cable

<sup>9)</sup> For higher clock frequencies, choose synchronous SSI

<sup>10)</sup> Step sequence in direction of rotation

## 2 Other configurations on request

### Order information

#### ATM 60 blind hollow shaft; Us 10 ... 32 V; SSI

#### 2 Configuration ex-works: 4,096 steps x 4,096 revolutions, Gray-Code, Set = 0


Type	Part no.	Explanation
ATM60-AAA12X12	1 030 009	Connector M23, 12 pin
ATM60-AAK12X12	1 030 010	Cable 1.5 m
ATM60-AAL12X12	1 030 011	Cable 3 m
ATM60-AAM12X12	1 030 012	Cable 5 m
ATM60-AAN12X12	1 033 169	Cable 10 m

#### 1 Attention: Please order the collet with required diameter separately

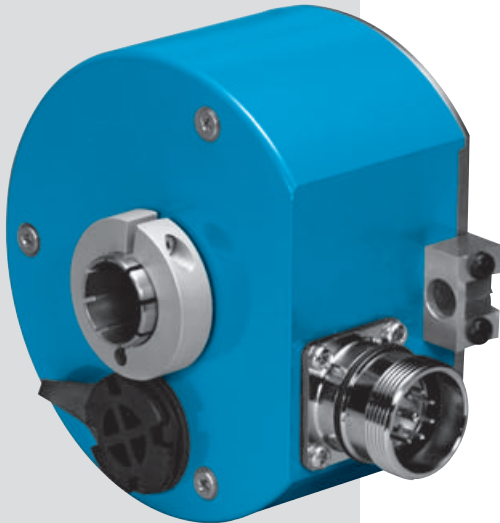
Type	Part no.	Shaft diameter
SPZ-006-AD-A	2 029 174	6 mm
SPZ-1E4-AD-A	2 029 175	1/4"
SPZ-008-AD-A	2 029 176	8 mm
SPZ-3E8-AD-A	2 029 177	3/8"
SPZ-010-AD-A	2 029 178	10 mm
SPZ-012-AD-A	2 029 179	12 mm
SPZ-1E2-AD-A	2 029 180	1/2"

For 15 mm shaft diameter, collet is not needed

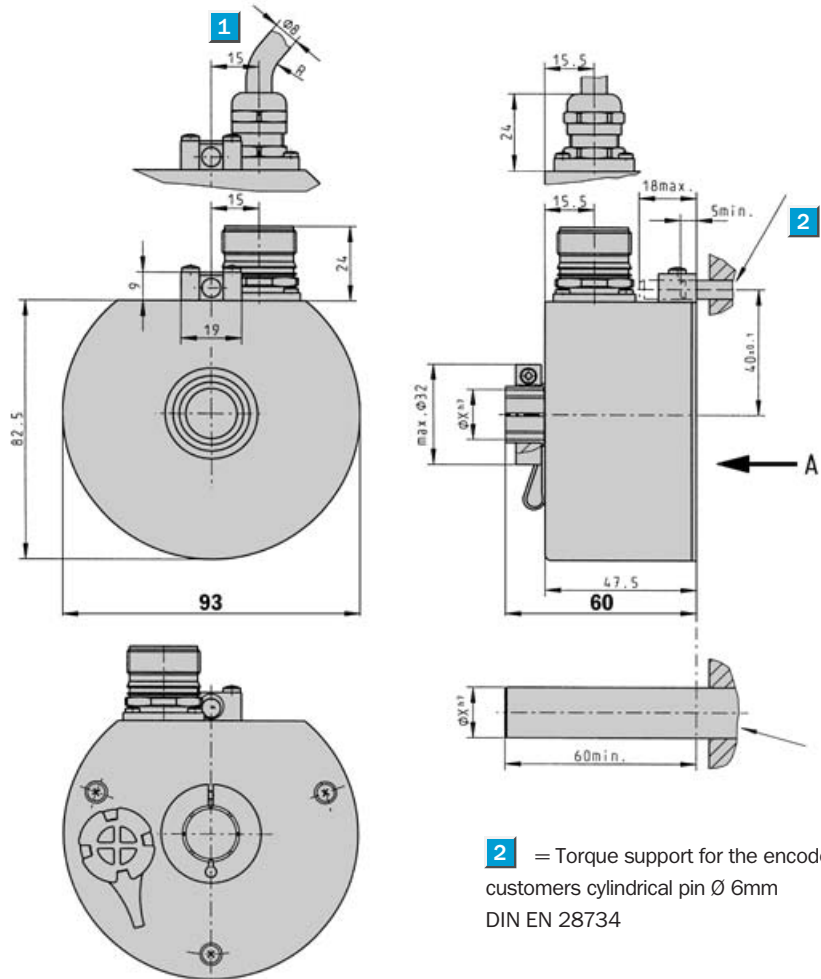


 **Resolution up to 26 bits**  
Absolute Encoder Multiturn

- Extremely robust
- SSI and RS 422 configuration interface
- Electronically adjustable, resolution adjustable
- Highly shock- and vibration-proof
- High degree of protection IP 65



## Dimensional drawing through hollow shaft; connector radial, cable radial



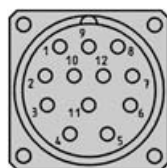
**2** = Torque support for the encoder via customers cylindrical pin  $\phi 6\text{mm}$  DIN EN 28734

**1** = bending radius min. 40 mm

General tolerances according DIN ISO 2768-mk

## PIN and wire allocation

PIN	Signal	Wire colours (cable outlet)	Explanation
1	GND	blue	Earth connection
2	Data +	white	Signal line
3	Clock +	yellow	Signal line
4	R x D +	grey	RS 422 programming line
5	R x D -	green	RS 422 programming line
6	T x D +	pink	RS 422 programming line
7	T x D -	black	RS 422 programming line
8	$U_s$	red	Supply voltage
9	SET	orange	Electronical adjustment
10	Data -	brown	Signal line
11	Clock -	lilac	Signal line
12	CW/CCW	orange/black	Counting sequence when turning
	Screen		Housing potential



View of the connector M23 fitted to the encoder body

**CW/CCW** Forward/reverse:  
This input programs the counting direction of the encoder. If not connected, this input is "HIGH". If the encoder shaft, as viewed on the drive shaft, rotates in the clockwise direction, it counts in an increasing sequence. If it should count upwards when the shaft rotates in the anti-clockwise direction, this connection must be connected permanently to "LOW" level (zero volts).

**SET** This input activates the electronic zero set.  
When the SET line is connected to  $U_s$  for more than 100 ms, the current mechanical position is assigned the value 0 or the pre-programmed SET-value.



## See chapter Accessories

Accessories for encoders

Technical data according to DIN 32878		ATM 90 SSI	Flange type
			through
<b>Hollow shaft diameter</b>	12, 16 mm, 1/2"		
<b>Mass <sup>1)</sup></b>	Approx. 0.8 kg		
<b>Moment of inertia of the rotor</b>	152.77 gcm <sup>2</sup>		
<b>Programmable code type</b>	Gray/binary		
<b>Programmable code direction</b>	CW/CCW		
<b>Measuring step</b>	0.043°		
<b>Max. number of steps per revolution</b>	8,192		
<b>Max. number of revolutions</b>	8,192		
<b>Error limits</b>	± 0.25°		
<b>Repeatability</b>	0.1°		
<b>Operating speed</b>	2,000 min <sup>-1</sup>		
<b>Position forming time</b>	0.15 ms		
<b>Max. angular acceleration</b>	5 x 10 <sup>5</sup> rad/s <sup>2</sup>		
<b>Operating torque</b>	0.4 Ncm		
<b>Start up torque</b>	0.5 Ncm		
<b>Bearing lifetime</b>	3.6 x 10 <sup>9</sup> revolutions		
<b>Working temperature range</b>	- 20 ... + 70 °C		
<b>Storage temperature range</b>	- 40 ... + 100 °C		
<b>Permissible relative humidity</b>	98 %		
<b>EMC <sup>2)</sup></b>			
<b>Resistance</b>			
to shocks <sup>3)</sup>	100/6 g/ms		
to vibration <sup>4)</sup>	20/10 ... 2000 g/Hz		
<b>Protection class acc. IEC 60529</b>			
with shaft seal	IP 65		
<b>Operating voltage range (Us)</b>	10 ... 32 V		
<b>Power consumption</b>	0.8 W		
<b>Initialisation time <sup>5)</sup></b>	1050 ms		
<b>Signals <sup>6)</sup></b>			
<b>Interface signals</b>			
Clock +, Clock -, Data +, Data - <sup>7)</sup>	SSI max. clock frequency 1 MHz i.e. min. duration of low level (clock +): 500 ns		
T x D +, T x D -, R x D +, R x D -	RS 422		
SET (electronic adjustment)	H-active (L ≙ 0 - 4.7 V; H ≙ 10 - Us V)		
CW/CCW <sup>8)</sup>	L-active (L ≙ 0 - 0.9 V; H ≙ 1.9 - Us V)		

<sup>1)</sup> For an encoder with connector outlet

<sup>2)</sup> To DIN EN 61000-6-2 and DIN EN 61000-6-3

<sup>3)</sup> To DIN EN 60068-2-27

<sup>4)</sup> To DIN EN 60068-2-6

<sup>5)</sup> From the moment the supply voltage is applied, this is the time which elapses before the data word can be correctly read in

<sup>6)</sup> Carried by 12 way connector, potential-free with respect to housing, or 12 core cable

<sup>7)</sup> For higher clock frequencies, choose synchronous SSI

<sup>8)</sup> Step sequence in direction of rotation

#### Order information

**ATM 90 through hollow shaft; Us 10 ... 32 V; SSI**

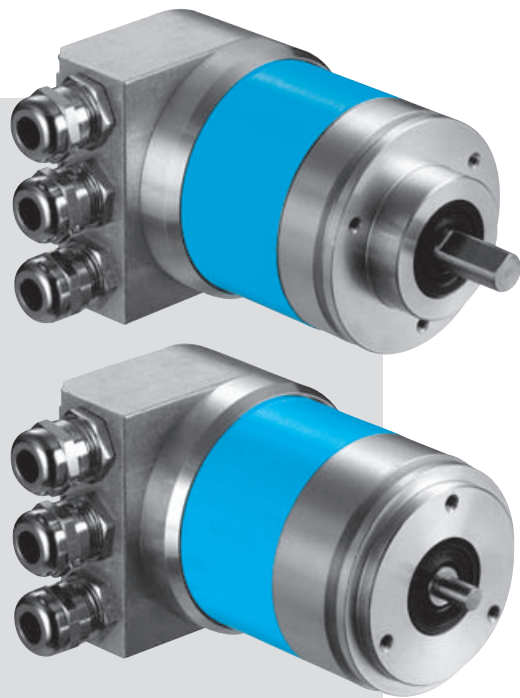
**1 Configuration ex-works: 4,096 steps x 4,096 revolutions, Gray-Code, Set = 0**

Type	Part no.	Explanation
ATM90-ATA12X12	1 030 030	Ø12 mm, connector M23, 12 pin
ATM90-ATK12X12	1 030 031	Ø12 mm, cable 1.5 m
ATM90-ATL12X12	1 030 032	Ø12 mm, cable 3 m
ATM90-ATM12X12	1 030 033	Ø12 mm, cable 5 m
ATM90-AUA12X12	1 030 034	Ø1/2", connector M23, 12 pin
ATM90-AUK12X12	1 030 035	Ø1/2", cable 1.5 m
ATM90-AUL12X12	1 030 036	Ø1/2", cable 3 m
ATM90-AUM12X12	1 030 037	Ø1/2", cable 5 m
ATM90-AXA12X12	1 030 038	Ø16 mm, connector M23, 12 pin
ATM90-AXK12X12	1 030 039	Ø16 mm, cable 1.5 m
ATM90-AXL12X12	1 030 040	Ø16 mm, cable 3 m
ATM90-AXM12X12	1 030 041	Ø16 mm, cable 5 m

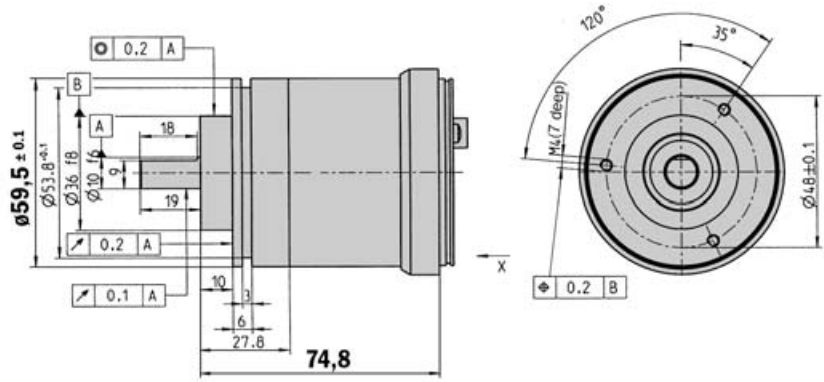
**1 Other configurations on request**

**Resolution up to 26 bits**  
 Absolute Encoder Multiturn

- Extremely robust
- RS 485 bus coupling to Profibus DP Specification
- Electronically adjustable, configuration adjustable
- Highly shock- and vibration-proof
- High degree of protection IP 67

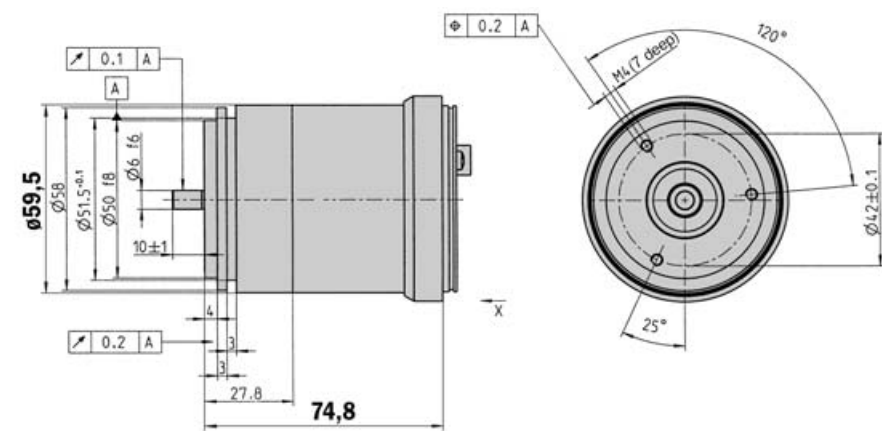


### Dimensional drawing face mount flange



General tolerances according DIN ISO 2768-mk

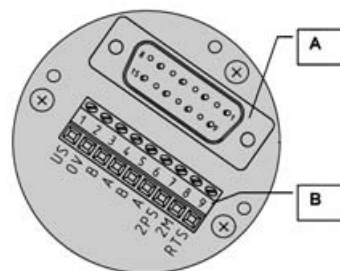
### Dimensional drawing servo flange



General tolerances according DIN ISO 2768-mk

### 1 PIN and wire allocation for Profibus adaptor

Terminal strip	Connector 4 pin	Connector 5 pin	Conn. female 5 pin	Signal	Explanation
1	1	–	–	U <sub>s</sub> (24 V)	Supply voltage 10 ... 32 V
2	3	–	–	0 V (GND)	Ground (0 V)
3	–	–	4	B	Profibus DP B line (out)
4	–	–	2	A	Profibus DP A line (out)
5	–	4	–	B	Profibus DP B line (in)
6	–	2	–	A	Profibus DP A line (in)
7	–	–	1	2P5 <sup>1)</sup>	+ 5 V (DC isolated)
8	–	–	3	2M <sup>1)</sup>	0 V (DC isolated)
9	–	–	–	RTS <sup>2)</sup>	Request To Send
–	2	1	–	N. C.	–
–	4	3	–	N. C.	–
–	–	5	5	Screen	Housing potential



A Internal plug connection to the encoder  
 B External connection to the bus

<sup>1)</sup> Use for external bus termination or to supply the transmitter/receiver of an optical transmission link.

<sup>2)</sup> Signal is optional, used to detect the direction of an optical connection.

**1** Encoders with a Profibus adaptor have a terminal strip for connecting the bus and supply lines. In order to connect the lines, the Profibus adaptor is unscrewed from the complete device. The figure shows the pin allocation within the bus connection.



Technical data according to DIN 32878		ATM 60 Profibus		Flange type							
		face m.	servo								
<b>Solid shaft</b>	10 mm										
	6 mm										
<b>Mass</b>	Approx. 0.59 kg										
<b>Moment of inertia of the rotor</b>	35 gcm <sup>2</sup>										
<b>Measuring step</b>	0.043°										
<b>Max. number of steps per revolution</b>	8,192										
<b>Max. number of revolutions</b>	8,192										
<b>Error limits</b>	± 0.25°										
<b>Repeatability</b>	0.1°										
<b>Operating speed</b>	6,000 min <sup>-1</sup>										
<b>Position forming time</b>	0.15 ms										
<b>Max. angular acceleration</b>	5 x 10 <sup>5</sup> rad/s <sup>2</sup>										
<b>Operating torque</b>											
with shaft seal	1.8 Ncm										
without shaft seal <sup>1)</sup>	0.3 Ncm										
<b>Start up torque</b>											
with shaft seal	2.5 Ncm										
without shaft seal <sup>2)</sup>	0.5 Ncm										
<b>Max. shaft loading</b>											
radial	300 N										
axial	50 N										
<b>Bearing lifetime</b>	3.6 x 10 <sup>9</sup> revolutions										
<b>Working temperature range</b>	- 20 ... + 80 °C										
<b>Storage temperature range</b>	- 40 ... + 125 °C										
<b>Permissible relative humidity</b>	98 %										
<b>EMC <sup>2)</sup></b>											
<b>Resistance</b>											
to shocks <sup>3)</sup>	100/6 g/ms										
to vibration <sup>4)</sup>	20/10 ... 2000 g/Hz										
<b>Protection class acc. IEC 60529</b>											
with shaft seal	IP 67										
without shaft seal <sup>5)</sup>	IP 43										
without shaft seal <sup>6)</sup>	IP 66										
<b>Operating voltage range (Us)</b>	10 ... 32 V										
<b>Power consumption</b>	2.0 W										
<b>Initialisation time <sup>7)</sup></b>	1250 ms										
<b>Bus Interface Profibus DP</b>											
<b>Electrical interface <sup>8)</sup></b>	RS 485										
<b>Protocol</b>	Profile for Encoders (07 <sub>hex</sub> ) – Class 2										
<b>Address setting (node number)</b>	0 ... 127 (DIP switches or protocol)										
<b>Data transmission rate (Baudrate)</b>	9.6 kBaud – 12 MBaud <sup>9)</sup>										
<b>Electronic adjustment (Number SET)</b>	Via PRESET push button or protocol										
<b>Status information</b>	Operation (LED green), bus activity (LED red)										
<b>Bus termination</b>	Via DIP switches <sup>10)</sup>										
<b>Electrical connection</b>	Bus adaptor with screw fixing (x3)										

<sup>1)</sup> If the shaft seal has been removed by the customer

<sup>2)</sup> To DIN EN 61000-6-2 and DIN EN 61000-6-3

<sup>3)</sup> To DIN EN 60068-2-27

<sup>4)</sup> To DIN EN 60068-2-6

<sup>5)</sup> On encoder flange not sealed

<sup>6)</sup> On encoder flange sealed

<sup>7)</sup> From the moment the supply voltage is applied, this is the time which elapses before the data word can be correctly read in

<sup>8)</sup> To EN 50 170-2 (DIN 19245 part 1-3)  
DC isolated via opto-couplers

<sup>9)</sup> Automatic detection

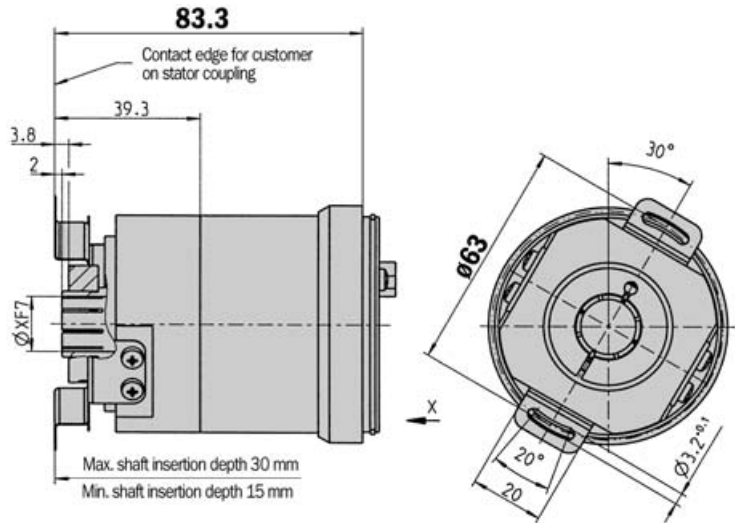
<sup>10)</sup> Should only be connected in the final device

Order information		
<b>ATM 60 Profibus face mount flange and servo flange solid shaft; U<sub>s</sub> 10 ... 32 V</b>		
Type	Part no.	Explanation
ATM60-P4H13X13	1 030 013	Face mount fl., solid shaft Ø 10 mm
ATM60-P1H13X13	1 030 014	Servo flange, solid shaft Ø 6 mm
<b>Attention: Please order the Profibus adaptor separately (see page 30)</b>		

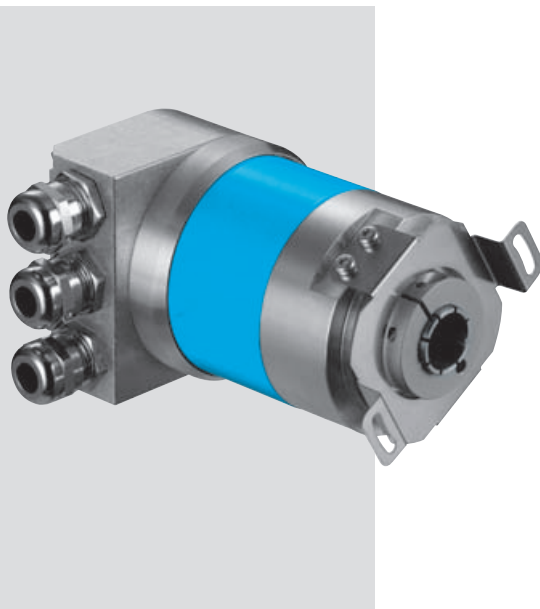
**Resolution up to 26 bits**  
**Absolute Encoder Multiturn**

- Extremely robust
- RS 485 bus coupling to Profibus DP Specification
- Electronically adjustable, resolution adjustable
- Highly shock- and vibration-proof
- High degree of protection IP 67

### Dimensional drawing blind hollow shaft

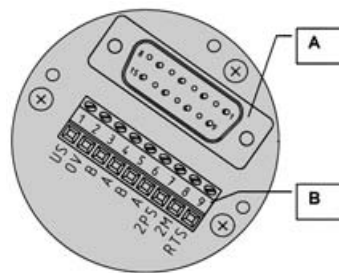


General tolerances according DIN ISO 2768-mk



### 1 PIN and wire allocation for Profibus adaptor

Terminal strip	Connector 4 pin	Connector 5 pin	Conn. female 5 pin	Signal	Explanation
1	1	–	–	U <sub>s</sub> (24 V)	Supply voltage 10 ... 32 V
2	3	–	–	0 V (GND)	Ground (0 V)
3	–	–	4	B	Profibus DP B line (out)
4	–	–	2	A	Profibus DP A line (out)
5	–	4	–	B	Profibus DP B line (in)
6	–	2	–	A	Profibus DP A line (in)
7	–	–	1	2P5 <sup>1)</sup>	+ 5 V (DC isolated)
8	–	–	3	2M <sup>1)</sup>	0 V (DC isolated)
9	–	–	–	RTS <sup>2)</sup>	Request To Send
–	2	1	–	N. C.	–
–	4	3	–	N. C.	–
–	–	5	5	Screen	Housing potential



**A** Internal plug connection to the encoder  
**B** External connection to the bus

- <sup>1)</sup> Use for external bus termination or to supply the transmitter/receiver of an optical transmission link.
- <sup>2)</sup> Signal is optional, used to detect the direction of an optical connection.

**1** Encoders with a Profibus adaptor have a terminal strip for connecting the bus and supply lines. In order to connect the lines, the Profibus adaptor is unscrewed from the complete device. The figure shows the pin allocation within the bus connection.



See chapter Accessories

Accessories for encoders

Technical data according to DIN 32878		ATM 60 Profibus		Flange type					
				blind					
<b>1</b> Hollow shaft diameter	6, 8, 10, 12, 15 mm, 1/4", 3/8", 1/2"								
Mass	Approx. 0.59 kg								
Moment of inertia of the rotor	55 gcm <sup>2</sup>								
Measuring step	0.043°								
Max. number of steps per revolution	8,192								
Max. number of revolutions	8,192								
Error limits	± 0.25°								
Repeatability	0.1°								
Operating speed	3,000 min <sup>-1</sup>								
Position forming time	0.25 ms								
Max. angular acceleration	5 x 10 <sup>5</sup> rad/s <sup>2</sup>								
Operating torque	0.8 Ncm <sup>1)</sup>								
Start up torque	1.2 Ncm <sup>1)</sup>								
<b>Permissible shaft movement of the drive element</b>									
radial static/dynamic	± 0.3/± 0.1 mm								
axial static/dynamic	± 0.5/± 0.2 mm								
Bearing lifetime	3.6 x 10 <sup>9</sup> revolutions								
Working temperature range	- 20 ... + 80 °C								
Storage temperature range	- 40 ... + 125 °C								
Permissible relative humidity	98 %								
<b>EMC <sup>2)</sup></b>									
<b>Resistance</b>									
to shocks <sup>3)</sup>	100/6 g/ms								
to vibration <sup>4)</sup>	20/10 ... 2000 g/Hz								
Protection class acc. IEC 60529 <sup>1)</sup>	IP 67								
without shaft seal <sup>5)</sup>	IP 43								
Operating voltage range (Us)	10 ... 32 V								
Power consumption	2.0 W								
Initialisation time <sup>6)</sup>	1250 ms								
<b>Bus Interface Profibus DP</b>									
Electrical Interface <sup>7)</sup>	RS 485								
Protocol	Profile for Encoders (07 <sub>hex</sub> ) – Class 2								
Address setting (node number)	0 ... 127 (DIP switches or protocol)								
Data transmission rate (baud rate)	9.6 kBaud – 12 MBaud <sup>8)</sup>								
Electronic adjustment (number SET)	Via PRESET push button or protocol								
Status information	Operation (green LED), bus activity (red LED)								
Bus termination	Via DIP switches <sup>9)</sup>								
Electrical connection	Bus connector with screw fixing (x3)								

<sup>1)</sup> With shaft seal

<sup>2)</sup> To DIN EN 61000-6-2 and DIN EN 61000-6-3

<sup>3)</sup> To DIN EN 60068-2-27

<sup>4)</sup> To DIN EN 60068-2-6

<sup>5)</sup> On encoder flange not sealed

<sup>6)</sup> From the moment the supply voltage is applied, this is the time which elapses before the data word can be correctly read in

<sup>7)</sup> To EN 50 170-2 (DIN 19245 part 1-3) DC isolated via opto-couplers

<sup>8)</sup> Automatic detection

<sup>9)</sup> Should only be connected in the final device

#### Order information

##### ATM 60 Profibus blind hollow shaft; U<sub>s</sub> 10 ... 32 V

Type	Part no.	Explanation
ATM60-PAH13X13	1 030 015	Blind hollow shaft

**Attention: Please order the Profibus adaptor separately (see page 30)**

#### **1** Attention: Please order the collet with required diameter separately

Type	Part no.	Shaft diameter
SPZ-006-AD-A	2 029 174	6 mm
SPZ-1E4-AD-A	2 029 175	1/4"
SPZ-008-AD-A	2 029 176	8 mm
SPZ-3E8-AD-A	2 029 177	3/8"
SPZ-010-AD-A	2 029 178	10 mm
SPZ-012-AD-A	2 029 179	12 mm
SPZ-1E2-AD-A	2 029 180	1/2"

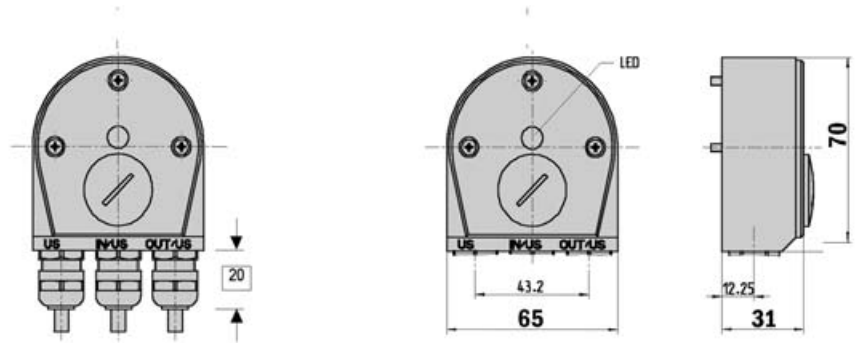
For 15 mm shaft diameter, collet is not needed



**Resolution up to 26 bits**  
 Absolute Encoder Multiturn

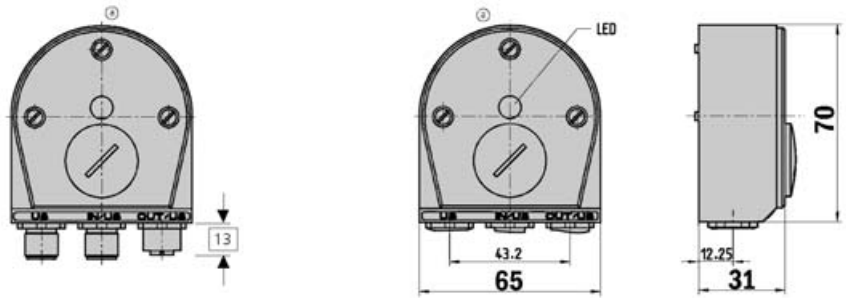
- Extremely robust
- RS 485 bus coupling to Profibus DP Specification
- Electronically adjustable, resolution adjustable
- Highly shock- and vibration-proof
- High degree of protection IP 67

Dimensional drawing Profibus adaptor KA3

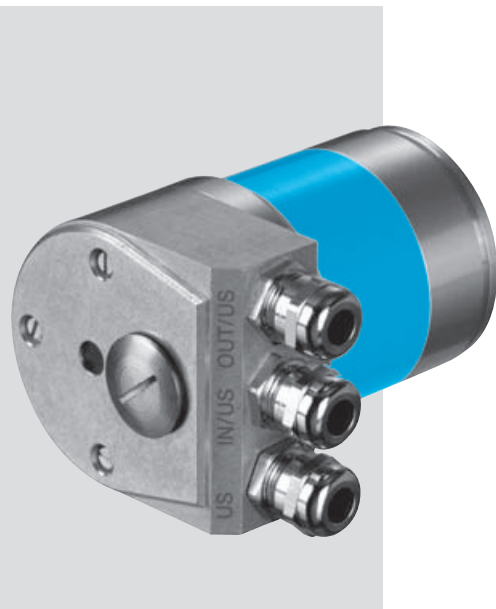


General tolerances according DIN ISO 2768-mk

Dimensional drawing Profibus adaptor SR3



General tolerances according DIN ISO 2768-mk



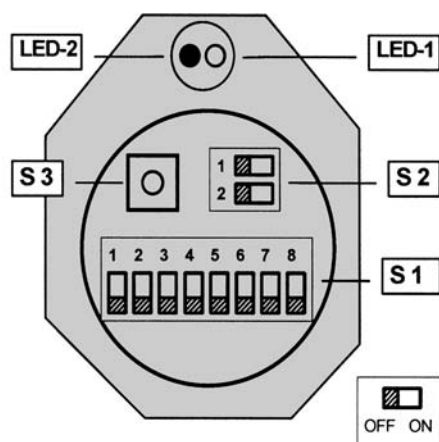
**Order information**

**ATM 60 Profibus adaptor**

Type	Part no.	Explanation
AD-ATM60-KA3PR	2 029 225	Profibus adaptor KA3, 3 x PG
AD-ATM60-SR3PR	2 031 985	Profibus adaptor SR3, 1 x M12, 4 pin., 2 x M12, 5 pin.



## Switch settings



## Switch settings

Access to the switches is gained by opening the removable screw cap (PG) on the rear of the bus adaptor. Use of the following elements.

S 1 (1-7)	Address setting (0 ... 127)
S 1 (8-8)	Counting direction (CW/CCW)
S 2	Bus termination
S 3	Preset push button (Number SET)

## Status information via LEDs

LED-1	Operating voltage (green)
LED-2	Bus activity (red)

## Implementation

## DP Functionalities

in accordance with the Profibus DP basic functions.

## DP services

- Data interchange (Write\_Read\_Data)
- Address allocation (Set\_Slave\_Address)
- Control commands (Global\_Control)
- Read the inputs (Read\_Inputs)
- Read the outputs (Read\_Outputs)
- Read diagnostic data (Slave\_Diagnosis)
- Send configuration data (Set\_Param)
- Check configuration data (Chk\_Config)

## Communication

- Cyclic master – slave data traffic

## Protective mechanisms

- Data transfer with HD = 4
- Time monitoring of the data traffic

## Configuration

Settings in accordance with Encoder Profile

- Counting direction (CW, CCW)
- Class-2 functionality (ON, OFF)
- Scaling function (ON, OFF)
- Steps per turn (1 ... 8192)
- Total resolution (GA) -- 1 ... 67,108,864 steps, with  $GA = 2^n \times SpU$ . -- ( $n=0 \dots 13$ )
- "Activation of SSA-service" <sup>2)</sup>
- Selection of the station address <sup>2)</sup>

## Configuration

Setting the formats (IN/OUT) for the cyclic data interchange via configuration byte (K-1)

2 words IN/OUT data (I-1/O-1) <sup>1)</sup>

4 words IN/OUT data (I-1, I-2, I-3/O-1) <sup>2)</sup>

## Data interchange: - Input Data (IN)

I-1	Position value <sup>1)</sup>	4 bytes
I-2	Speed (rev/min) <sup>2)</sup>	2 bytes
I-3	Time stamp <sup>2)</sup>	2 bytes

## Data interchange: - Output data (OUT)

O-1	PRESET Value <sup>1)</sup>	4 bytes
-----	----------------------------	---------

## Diagnostic information

- Station-related diagnosis (63 bytes in acc. with Encoder Profile Class 2)

## Setting: - PRESET value

The PRESET function is used for set into operation and to allocate a specific position value to the current physical angular position.

The following settings are possible:

- by hardware (PRESET push button: S3)
- by software: -- (see Output data)

## Setting: - Counting direction

- by hardware via DIP switch S1-(8)
- by software via Telegram

Counting direction increasing:

Rotation of the shaft in the clockwise direction (CW) as viewed on the shaft

## Setting: - Station address

- by hardware via DIP switch S1
- by software via Telegram

The setting by software is carried out only if the "SSA-service" has been previously activated.

## Setting: - Bus termination

The 2-way DIP switch (S2) permits an internal bus termination to be switched in and out (ON/OFF).

If the bus is terminated externally, switch S2 must be in the OFF position.

## Device-specific file (GS.)

For the purpose of automatic set into operation of the encoder, use is made of the GS file.

All the characteristic features of the device are defined in it.

STEG 00FE.GSD	German
STEG 00FE.GSE	English
STEG 00FE.GSF	French

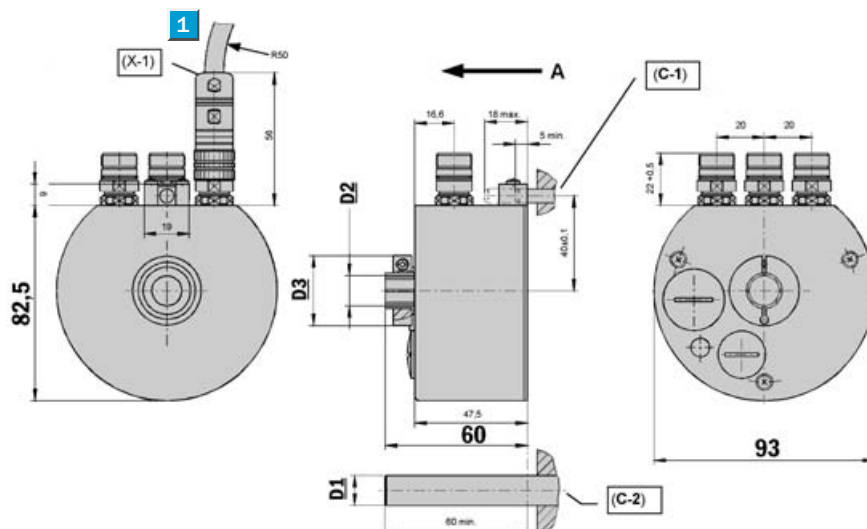
<sup>1)</sup> As per Encoder Profile

<sup>2)</sup> Manufacturer specific function

**Resolution up to 26 bits**  
**Absolute Encoder Multiturn**

- Extremely robust
- RS 485 bus coupling to Profibus DP Specification
- Electronically adjustable, resolution adjustable
- Highly shock- and vibration-proof
- High degree of protection IP 65

### Dimensional drawing through hollow shaft, connector radial



**1** = bending radius min. 40 mm

General tolerances according DIN ISO 2768-mk

Through hollow shaft	D1	D2	D3
12 mm	12.0 <sub>h7</sub>	12.0 <sup>F7</sup>	29.5
1/2"	12.7 <sub>h7</sub>	12.7 <sup>F7</sup>	29.5
16 mm	16.0 <sub>h7</sub>	16.0 <sup>F7</sup>	32.0

<b>C - 1</b>	Torque support via cylindrical pin (customer) Ø 6 <sub>m6</sub> to DIN EN ISO 8734
<b>C - 2</b>	Drive shaft (customer)
<b>X - 1</b>	7 pin plug connector MINITEC, (3x)
<b>A</b>	Direction of view on encoder (used to define the direction of rotation)

### PIN and wire allocation Profibus DP (In/Out)

PIN	Signal	Explanation
1	RTS	Request To Send <sup>2)</sup>
2	A	Profibus DP A line
3	N. C.	Not connected
4	B	Profibus DP B line
5	2M	0 V (potential free) <sup>1)</sup>
6	2P5	+ 5 V (potential free) <sup>1)</sup>
7	N. C.	Not connected



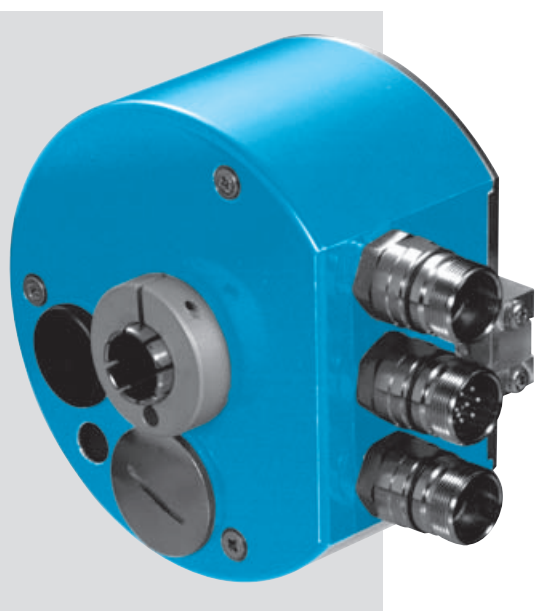
- <sup>1)</sup> Use for external bus termination or to supply the transmitter/receiver of an optical fibre transmission link.  
<sup>2)</sup> Signal is optional, is used to detect the direction of an optical fibre connection.

### PIN and wire allocation U<sub>s</sub>

PIN	Signal	Explanation
1	U <sub>s</sub> (24 V)	Supply voltage
2	N. C.	Not connected
3	GND (0 V)	0 V (Gnd)
4	N. C.	Not connected
5	RTS	Request To Send <sup>2)</sup>
6	N. C.	Not connected
7	N. C.	Not connected



- <sup>2)</sup> Signal is optional, is used to detect the direction of an optical fibre connection.  
 N. C. = Not connected



See chapter Accessories

Accessories for encoders



Technical data acc. to DIN 32878		ATM 90 Profibus connector radial		Flange type	
		through			
<b>Hollow shaft diameter</b>	12, 16 mm, 1/2"				
<b>Mass</b>	Approx. 0.6 kg				
<b>Moment of inertia of the rotor</b>	153 gcm <sup>2</sup>				
<b>Measuring step</b>	0.043°				
<b>Max. number of steps per revolution</b>	8,192				
<b>Max. number of revolutions</b>	8,192				
<b>Error limits</b>	± 0.25°				
<b>Repeatability</b>	0.1°				
<b>Operating speed</b>	3,000 min <sup>-1</sup>				
<b>Position forming time</b>	0.25 ms				
<b>Max. angular acceleration</b>	0.6 x 10 <sup>5</sup> rad/s <sup>2</sup>				
<b>Operating torque</b>	0.4 Ncm				
<b>Start up torque</b>	0.5 Ncm				
<b>Bearing lifetime</b>	3.6 x 10 <sup>9</sup> revolutions				
<b>Working temperature range</b>	- 20 ... + 80 °C				
<b>Storage temperature range</b>	- 40 ... + 125 °C				
<b>Permissible relative humidity</b>	98 %				
<b>EMC 1)</b>					
<b>Resistance</b>					
to shocks 2)	100/6 g/ms				
to vibration 3)	20/10 ... 2000 g/Hz				
<b>Protection class acc. IEC 60529</b>					
with shaft seal	IP 65				
<b>Operating voltage range (Us)</b>	10 ... 32 V				
<b>Power consumption</b>	2.0 W				
<b>Initialisation time 4)</b>	1250 ms				
<b>Bus Interface Profibus DP</b>					
<b>Electrical Interface 5)</b>	RS 485				
<b>Protocol</b>	Profile for Encoders (07 <sub>hex</sub> ) – Class 2				
<b>Address setting (node number)</b>	0 ... 127 (DIP switches or protocol)				
<b>Data transmission rate (baud rate)</b>	9.6 kBaud - 12 MBaud				
	automatic detection				
<b>Electronic adjustment (number SET)</b>	Via PRESET push button or protocol				
<b>Status information</b>	Operation (green LED), bus activity (red LED)				
<b>Bus termination 6)</b>	Via DIP switches				
<b>Electrical connection</b>	M14 plug connector (7 pin)				

1) To DIN EN 61000-6-2 and DIN EN 61000-6-3

2) To DIN EN 60068-2-27

3) To DIN EN 60068-2-6

4) From the moment the supply voltage is applied, this is the time which elapses before the data word can be correctly read in

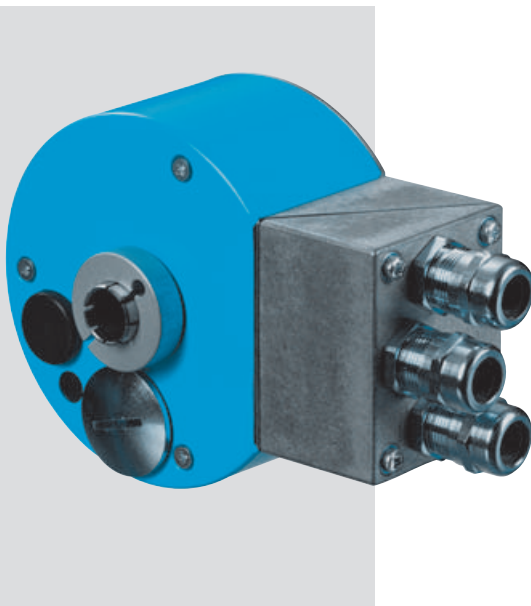
5) To EN 50 170-2 (DIN 19245 part 1-3) DC isolated via opto-couplers

6) Should only be connected in the final device

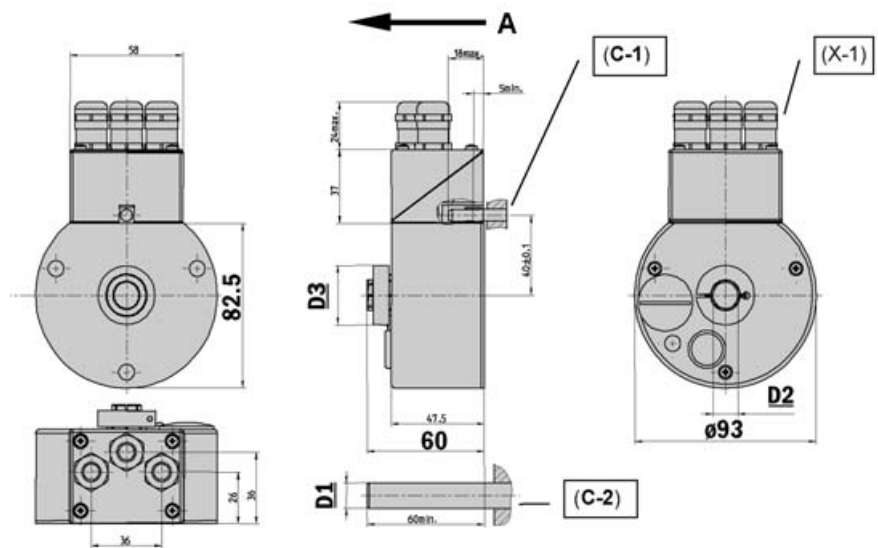
Order information		
ATM 90 Profibus through hollow shaft; connector radial; U <sub>s</sub> 10 ... 32 V		
Type	Part no.	Explanation
ATM90-PTF13X13	1 030 042	Through hollow Ø 12 mm, 3 x M14, 8.192 x 8.192
ATM90-PUF13X13	1 030 043	Through hollow Ø 1/2", 3 x M14, 8.192 x 8.192
ATM90-PXF13X13	1 030 044	Through hollow Ø 16 mm, 3 x M14, 8.192 x 8.192
ATM90-PTF13X11	1 032 654	Through hollow Ø 12 mm, 3 x M14, 8.192 x 2.048
ATM90-PUF13X11	1 032 655	Through hollow Ø 1/2", 3 x M14, 8.192 x 2.048
ATM90-PXF13X11	1 032 656	Through hollow Ø 16 mm, 3 x M14, 8.192 x 2.048
ATM90-PTF12X12	1 032 660	Through hollow Ø 12 mm, 3 x M14, 4.096 x 4.096
ATM90-PUF12X12	1 032 661	Through hollow Ø 1/2", 3 x M14, 4.096 x 4.096
ATM90-PXF12X12	1 032 662	Through hollow Ø 16 mm, 3 x M14, 4.096 x 4.096
ATM90-PTF11X13	1 032 896	Through hollow Ø 12 mm, 3 x M14, 2.048 x 8.192
ATM90-PUF11X13	1 032 897	Through hollow Ø 1/2", 3 x M14, 2.048 x 8.192
ATM90-PXF11X13	1 032 898	Through hollow Ø 16 mm, 3 x M14, 2.048 x 8.192

**Resolution up to 26 bits**  
 Absolute Encoder Multiturn

- Extremely robust
- RS 485 bus coupling to Profibus DP Specification
- Electronically adjustable, resolution adjustable
- Highly shock- and vibration-proof
- High degree of protection IP 65



## Dimensional drawing through hollow shaft cable radial



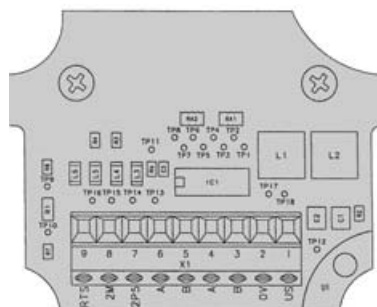
General tolerances according DIN ISO 2768-mk

Through hollow shaft	D1	D2	D3
12 mm	12.0 <sub>h7</sub>	12.0 <sup>F7</sup>	29.5
1/2"	12.7 <sub>h7</sub>	12.7 <sup>F7</sup>	29.5
16 mm	16.0 <sub>h7</sub>	16.0 <sup>F7</sup>	32.0

<b>C - 1</b>	Torque support via cylindrical pin (customer) $\varnothing 6_{m6}$ to DIN EN ISO 8734
<b>C - 2</b>	Drive shaft (customer)
<b>X - 1</b>	3x screw fixings for cable connection, metric M16 x 1.5, 17
<b>A</b>	Direction of view on encoder (used to define the direction of rotation)

## PIN and wire allocation for Profibus adaptor

PIN	Signal	Explanation
1	U <sub>s</sub> (24 V)	Supply voltage
2	GND (0 V)	0 V (Gnd)
3	B	Profibus DP B line (out)
4	A	Profibus DP A line (out)
5	B	Profibus DP B line (in)
6	A	Profibus DP A line (in)
7	2P5	+ 5 V (potential free) <sup>1)</sup>
8	2M	0 V (potential free) <sup>1)</sup>
9	RTS	Request To Send <sup>2)</sup>



<sup>1)</sup> Use for external bus termination or to supply the transmitter/receiver of an optical transmission link.

<sup>2)</sup> Signal is optional, used to detect the direction of an optical connection.



Technical data acc. to DIN 32878		ATM 90 Profibus with bus adaptor								Flange type				
<b>Hollow shaft diameter</b>	12, 16 mm, 1/2"													
<b>Mass</b>	Approx. 0.8 kg													
<b>Moment of inertia of the rotor</b>	153 gcm <sup>2</sup>													
<b>Measuring step</b>	0.043°													
<b>Max. number of steps per revolution</b>	8,192													
<b>Max. number of revolutions</b>	8,192													
<b>Error limits</b>	± 0.25°													
<b>Repeatability</b>	0.1°													
<b>Operating speed</b>	3,000 min <sup>-1</sup>													
<b>Position forming time</b>	0.25 ms													
<b>Max. angular acceleration</b>	0.6 x 10 <sup>5</sup> rad/s <sup>2</sup>													
<b>Operating torque</b>	0.4 Ncm													
<b>Start up torque</b>	0.5 Ncm													
<b>Bearing lifetime</b>	3.6 x 10 <sup>9</sup> revolutions													
<b>Working temperature range</b>	- 20 ... + 80 °C													
<b>Storage temperature range</b>	- 40 ... + 125 °C													
<b>Permissible relative humidity</b>	98 %													
<b>EMC 1)</b>														
<b>Resistance</b>														
to shocks 2)	100/6 g/ms													
to vibration 3)	20/10 ... 2000 g/Hz													
<b>Protection class acc. IEC 60529</b>														
with shaft seal	IP 65													
<b>Operating voltage range (Us)</b>	10 ... 32 V													
<b>Power consumption</b>	2.0 W													
<b>Initialisation time 4)</b>	1250 ms													
<b>Bus Interface Profibus DP</b>														
<b>Electrical Interface 5)</b>	RS 485													
<b>Protocol</b>	Profile for Encoders (07 <sub>hex</sub> ) – Class 2													
<b>Address setting (node number)</b>	DIP switches or protocol													
<b>Data transmission rate (baud rate)</b>	9.6 kBaud - 12 MBaud													
	Automatic detection													
<b>Electronic adjustment (number SET)</b>	Via PRESET push button or protocol													
<b>Status information</b>	Operation (green LED), bus activity (red LED)													
<b>Bus termination 6)</b>	Via DIP switches													
<b>Electrical connection</b>	Screw fixing for cable (3x)													

1) To DIN EN 61000-6-2 and DIN EN 61000-6-3

2) To DIN EN 60068-2-27

3) To DIN EN 60068-2-6


4) From the moment the supply voltage is applied, this is the time which elapses before the data word can be correctly read in

5) To EN 50 170-2 (DIN 19245 part 1-3) DC isolated via opto-couplers

6) Should only be connected in the final device

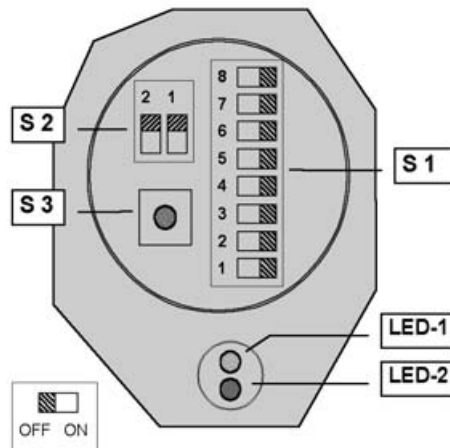
Order information		
ATM 90 Profibus through hollow shaft; cable radial; U <sub>s</sub> 10 ... 32 V		
Type	Part no.	Explanation
ATM90-PTG13X13	1 030 045	Through hollow Ø 12 mm, 3 x PG, 8.192 x 8.192
ATM90-PUG13X13	1 030 046	Through hollow Ø 1/2", 3 x PG, 8.192 x 8.192
ATM90-PXG13X13	1 030 047	Through hollow Ø 16 mm, 3 x PG, 8.192 x 8.192
ATM90-PTG13X11	1 032 657	Through hollow Ø 12 mm, 3 x PG, 8.192 x 2.048
ATM90-PUG13X11	1 032 658	Through hollow Ø 1/2", 3 x PG, 8.192 x 2.048
ATM90-PXG13X11	1 032 659	Through hollow Ø 16 mm, 3 x PG, 8.192 x 2.048
ATM90-PTG12X12	1 032 663	Through hollow Ø 12 mm, 3 x PG, 4.096 x 4.096
ATM90-PUG12X12	1 032 664	Through hollow Ø 1/2", 3 x PG, 4.096 x 4.096
ATM90-PXG12x12	1 032 665	Through hollow Ø 16 mm, 3 x PG, 4.096 x 4.096
ATM90-PTG11x13	1 032 899	Through hollow Ø 12 mm, 3 x PG, 2.048 x 8.192
ATM90-PUG11x13	1 032 900	Through hollow Ø 1/2", 3 x PG, 2.048 x 8.192
ATM90-PXG11x13	1 032 901	Through hollow Ø 16 mm, 3 x PG, 2.048 x 8.192
<b>Attention: Bus adaptor included</b>		



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Absolute Encoder Multiturn

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### Switch settings



### Switch settings

Access to the DIP switches used for configuring the encoder can be gained by removing the screw on the back of the encoder.

- |           |                                 |
|-----------|---------------------------------|
| S 1 (1-7) | Address setting (0 ... 127)     |
| S 1 (8-8) | Counting direction (CW/CCW)     |
| S 2       | Bus termination                 |
| S 3       | Preset push button (Number SET) |

In the version with a cable connection, the switches S1 and S2 are located inside the bus adaptor.

### Status information via LEDs

- |       |                           |
|-------|---------------------------|
| LED-1 | Operating voltage (green) |
| LED-2 | Bus activity (red)        |



See chapter Accessories

Accessories for encoders

## Implementation

### DP Functionalities

in accordance with the Profibus DP basic functions.

#### DP services

- Data interchange (Write\_Read\_Data)
- Address allocation (Set\_Slave\_Address)
- Control commands (Global\_Control)
- Read the inputs (Read\_Inputs)
- Read the outputs (Read\_Outputs)
- Read diagnostic data (Slave\_Diagnosis)
- Send configuration data (Set\_Param)
- Check configuration data (Chk\_Config)

#### Communication

- Cyclic master – slave data traffic

#### Protective mechanisms

- Data transfer with HD = 4
- Time monitoring of the data traffic

### Configuration

Settings in accordance with Encoder Profile

- Counting direction (CW, CCW)
- Class 2 functionality (ON, OFF)
- Scaling function (ON, OFF)
- Steps per turn (1 ... 8,192)
- Total resolution (TR) -- 1...6,108,864 steps, with TR = 2<sup>n</sup> x CPR -- (n=0 ... 13)
- "Activation of SSA-service" <sup>2)</sup>
- Selection of the station address <sup>2)</sup>

### Configuration

Setting the data format (Cx) for the cyclic data interchange (In/Out) via configuration byte (K-1).

C1 <sup>1)</sup> 2 Word (IO) (I-1/O-1)

C2 <sup>2)</sup> 4 Word (IO) (I-1, I-2, I-3/O-1)

### Data interchange: - Input Data (IN)

I-1	Position value <sup>1)</sup>	4 bytes
I-2	Speed (rev/min) <sup>2)</sup>	2 bytes
I-3	Time stamp <sup>2)</sup>	2 bytes

### Data interchange: - Output data (OUT)

O-1	PRESET Value <sup>1)</sup>	4 bytes
-----	----------------------------	---------

### Diagnostic information

- Station-related diagnosis (63 bytes in acc. with Encoder Profile Class 2)

### Setting: - PRESET value

The PRESET function is used for set into operation and to allocate a specific position value to the current physical angular position.

The following settings are possible:

- by hardware (PRESET push button: S3)
- by software: -- (see Output data )

### Setting: - Counting direction

- by hardware via DIP switch S1-(8)
- by software via Telegram

Counting direction increasing:

Rotation of the shaft in the clockwise direction (CW) as viewed on the shaft.

### Setting: - Station address

- by hardware via DIP switch S1
- by software via Telegram

The setting by software is carried out only if the "SSA-service" has been previously activated.

### Setting: - Bus termination

The 2-way DIP switch (S2) permits an internal bus termination to be switched in and out (ON/OFF).

If the bus is terminated externally, switch S2 must be in the OFF position.

### Device-specific file (GS.)

For the purpose of automatic set into operation of the encoder, use is made of the GS file.

All the characteristic features of the device are defined in it.

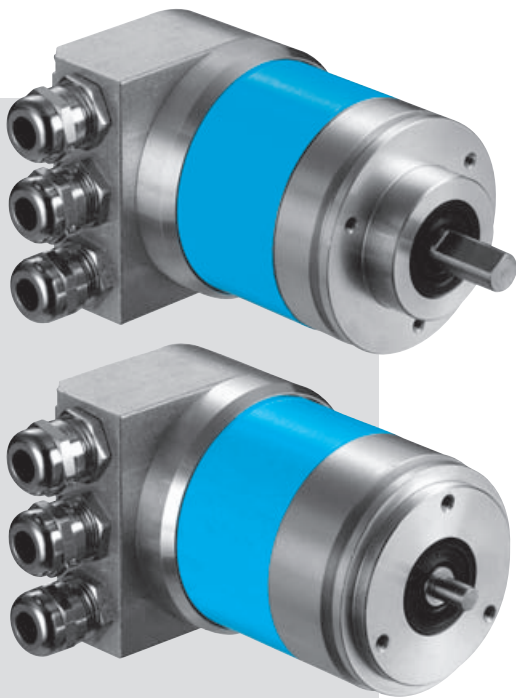
STEG 00FE.GSD	German
STEG 00FE.GSE	English
STEG 00FE.GSF	French

<sup>1)</sup> As per Encoder Profile

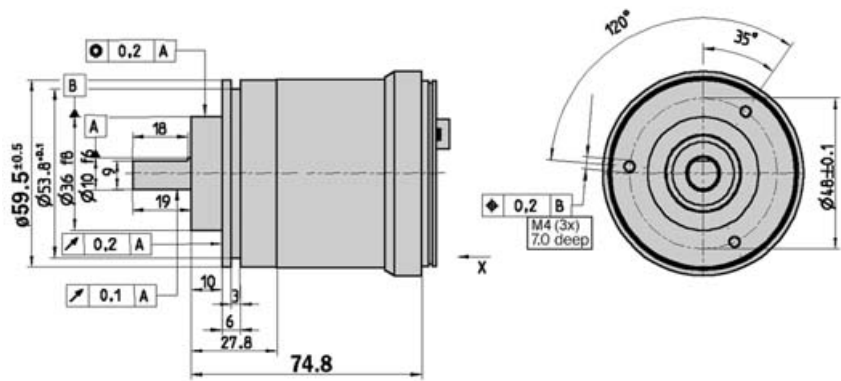
<sup>2)</sup> Manufacturer specific function

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 Absolute Encoder Multiturn

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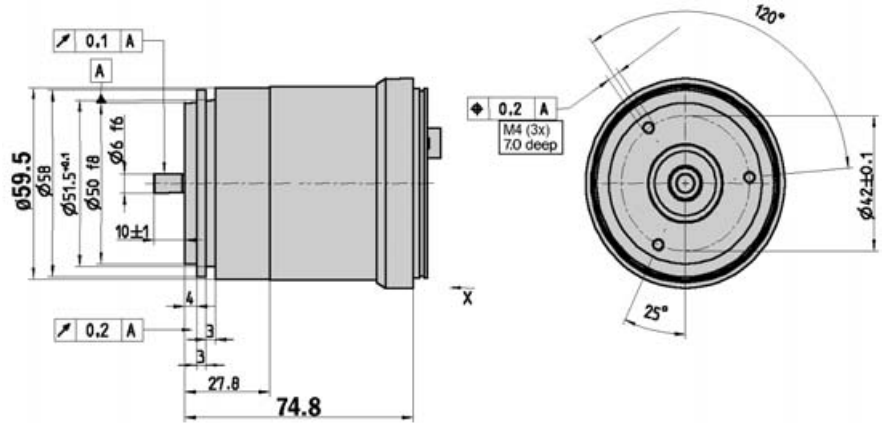


## Dimensional drawing face mount flange



General tolerances according DIN ISO 2768-mk

## Dimensional drawing servo flange



General tolerances according DIN ISO 2768-mk

## 1 PIN and wire allocation for bus adaptor

Terminal strip	Connector	Signal	Explanation
1	1	Shield	Screen
2	2	U <sub>s</sub> (24V)	Supply voltage 10 ... 32V
3	3	GND (COM)	0V (Gnd)
4	4	CAN <sub>H</sub>	CAN Bus Signal HIGH
5	5	CAN <sub>L</sub>	CAN Bus Signal LOW
6		CAN <sub>H</sub>	CAN Bus Signal HIGH
7		CAN <sub>L</sub>	CAN Bus Signal LOW
8		GND (COM)	0V (Gnd)
9		U <sub>s</sub> (24V)	Supply voltage 10 ... 32V

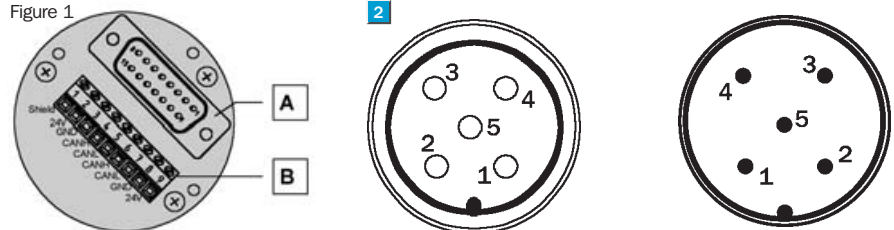


1 Encoders with a CANbus adaptor have a terminal strip for connecting the bus and supply lines. In order to connect the lines, the Profibus adaptor is unscrewed from the complete device. The figure 1 shows the pin allocation within the bus connection.

### See chapter Accessories

Accessories for encoders

Figure 1



A Internal plug connection to the encoder  
 B External connection to the bus

OUT/U<sub>s</sub> (female)

IN/U<sub>s</sub> (male)  
 Connector M12 (Bus adaptor)

Technical data according to DIN 32878		ATM 60 CANopen		Flange type							
		face m.	servo								
<b>Solid shaft</b>	10 mm										
	6 mm										
<b>Mass</b>	Approx. 0.59 kg										
<b>Moment of inertia of the rotor</b>	35 gcm <sup>2</sup>										
<b>Measuring step</b>	0.043°										
<b>Max. number of steps per revolution</b>	8,192										
<b>Max. number of revolutions</b>	8,192										
<b>Error limits</b>	± 0.25°										
<b>Repeatability</b>	0.1°										
<b>Operating speed</b>	6,000 min <sup>-1</sup>										
<b>Position forming time</b>	0.25 ms										
<b>Max. angular acceleration</b>	5 x 10 <sup>5</sup> rad/s <sup>2</sup>										
<b>Operating torque</b>											
with shaft seal	1.8 Ncm										
without shaft seal <sup>1)</sup>	0.3 Ncm										
<b>Start up torque</b>											
with shaft seal	2.5 Ncm										
without shaft seal <sup>2)</sup>	0.5 Ncm										
<b>Max. shaft loading</b>											
radial	300 N										
axial	50 N										
<b>Bearing lifetime</b>	3.6 x 10 <sup>9</sup> revolutions										
<b>Working temperature range</b>	- 20 ... + 80 °C										
<b>Storage temperature range</b>	- 40 ... + 125 °C										
<b>Permissible relative humidity</b>	98 %										
<b>EMC <sup>2)</sup></b>											
<b>Resistance</b>											
to shocks <sup>3)</sup>	100/6 g/ms										
to vibration <sup>4)</sup>	20/10 ... 2000 g/Hz										
<b>Protection class acc. IEC 60529</b>											
with shaft seal	IP 67										
without shaft seal <sup>5)</sup>	IP 43										
without shaft seal <sup>6)</sup>	IP 66										
<b>Operating voltage range (Us)</b>	10 ... 32 V										
<b>Power consumption</b>	2.0 W										
<b>Initialisation time <sup>7)</sup></b>	1250 ms										
<b>Bus Interface CANopen</b>											
<b>Electrical interface <sup>8)</sup></b>	ISO-DIS 11898										
<b>Protocol</b>	Communication Profile DS 301 V4.0										
	Device Profile DSP 406 V2.0										
<b>Address setting (NODE ID)</b>	0 ... 63 (DIP switches or protocol)										
<b>Data transmission rate (Baudrate)</b>	{10, 20, 50, 125, 250, 500} kB, 1MB (DIP switches or protocol)										
<b>Electronic adjustment (number SET)</b>	Via PRESET push button or protocol										
<b>Status Information</b>	2-colour LED for CAN Controller status										
<b>Bus termination <sup>9)</sup></b>	Via DIP switches										
<b>Electrical connection</b>	Screw fixing with PG-9 for cable										

<sup>1)</sup> In case that shaft seal has been removed by customer

<sup>2)</sup> To DIN EN 61000-6-2 and DIN EN 61000-6-3

<sup>3)</sup> To DIN EN 60068-2-27

<sup>4)</sup> To DIN EN 60068-2-6

<sup>5)</sup> Not sealed at encoder flange

<sup>6)</sup> Sealed at encoder flange

<sup>7)</sup> From the moment the supply voltage is applied, this is the time which elapses before the data word can be correctly read in

<sup>8)</sup> (CAN High Speed) and CAN Specification 2.0 B, DC isolated

<sup>9)</sup> Should only be connected in the final device

#### Order information

#### ATM 60 CANopen face mount and servo flange; solid shaft; U<sub>s</sub> 10 ... 32 V

Type	Part no.	Explanation
ATM60-C4H13X13	1 030 024	Face mount solid shaft Ø 10 mm
ATM60-C1H13X13	1 030 025	Servo flange solid shaft Ø 6 mm

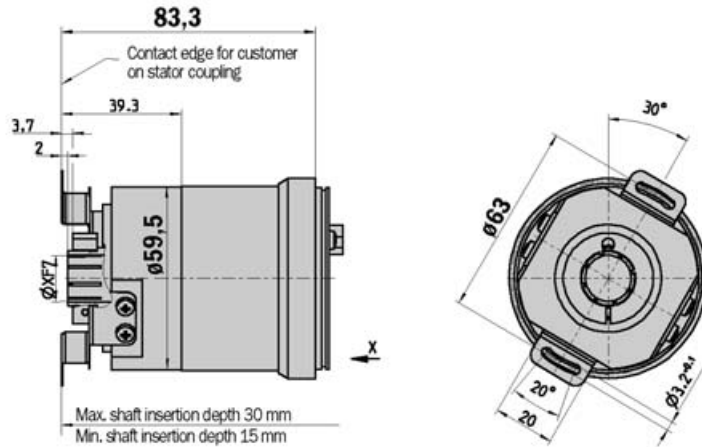
**Attention: Please order the CANbus adaptor separately (see page 42)**



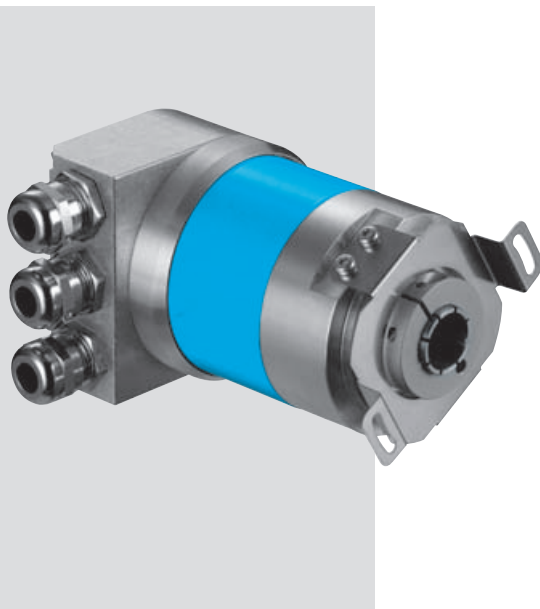
**Resolution up to 26 bits**  
**Absolute Encoder Multiturn**

- Extremely robust
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- High degree of protection IP 67

### Dimensional drawing blind hollow shaft



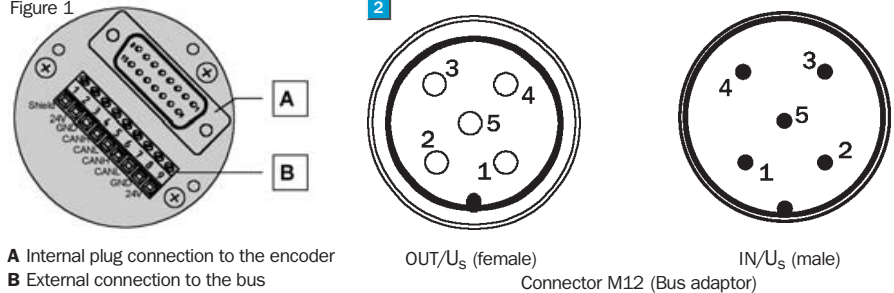
General tolerances according DIN ISO 2768-mk



### 1 PIN and wire allocation for bus adaptor

Terminal strip	Connector	Signal	Explanation
1	1	Shield	Screen
2	2	U <sub>s</sub> (24 V)	Supply voltage 10 ... 32 V
3	3	GND (COM)	0V (Gnd)
4	4	CAN <sub>H</sub>	CAN Bus Signal HIGH
5	5	CAN <sub>L</sub>	CAN Bus Signal LOW
6		CAN <sub>H</sub>	CAN Bus Signal HIGH
7		CAN <sub>L</sub>	CAN Bus Signal LOW
8		GND (COM)	0V (Gnd)
9		U <sub>s</sub> (24 V)	Supply voltage 10 ... 32 V

Figure 1



**1** Encoders with a CANbus adaptor have a terminal strip for connecting the bus and supply lines. In order to connect the lines, the Profibus adaptor is unscrewed from the complete device. The figure 1 shows the pin allocation within the bus connection.

### See chapter Accessories

Accessories for encoders

Technical data according to DIN 32878		ATM 60 CANopen		Flange type					
				blind					
<b>1</b> Hollow shaft diameter	6, 8, 10, 12, 15 mm, 1/4", 3/8", 1/2"								
Mass	Approx. 0.59 kg								
Moment of inertia of the rotor	55 gcm <sup>2</sup>								
Measuring step	0.043°								
Max. number of steps per revolution	8,192								
Max. number of revolutions	8,192								
Error limits	± 0.25°								
Repeatability	0.1°								
Operating speed	3,000 min <sup>-1</sup>								
Position forming time	0.25 ms								
Max. angular acceleration	5 x 10 <sup>5</sup> rad/s <sup>2</sup>								
Operating torque	0.8 Ncm <sup>1)</sup>								
Start up torque	1.2 Ncm <sup>1)</sup>								
<b>Permissible shaft movement of the drive element</b>									
radial static/dynamic	± 0.3/± 0.1 mm								
axial static/dynamic	± 0.5/± 0.2 mm								
Bearing lifetime	3.6 x 10 <sup>9</sup> revolutions								
Working temperature range	- 20 ... + 80 °C								
Storage temperature range	- 40 ... + 125 °C								
Permissible relative humidity	98 %								
<b>EMC <sup>2)</sup></b>									
<b>Resistance</b>									
to shocks <sup>3)</sup>	100/6 g/ms								
to vibration <sup>4)</sup>	20/10 ... 2000 g/Hz								
Protection class acc. IEC 60529 <sup>1)</sup>	IP 67								
without shaft seal <sup>5)</sup>	IP 43								
Operating voltage range (Us)	10 ... 32 V								
Power consumption	2.0 W								
Initialisation time <sup>6)</sup>	1250 ms								
<b>Bus Interface CANopen</b>									
Electrical interface <sup>7)</sup>	ISO-DIS 11898								
Protocol	Communication Profile DS 301 V4.0 Device Profile DSP 406 V2.0								
Address setting (NODE ID)	0 ... 63 (DIP switches or protocol)								
Data transmission rate (Baudrate)	{10, 20, 50, 125, 250, 500} kB, 1MB (DIP switches or protocol)								
Electronic adjustment (number SET)	Via PRESET push button or protocol								
Status Information	2-colour LED for CAN Controller status								
Bus termination <sup>8)</sup>	Via DIP switches								
Electrical connection	Screw fixing with PG-9 for cable								

<sup>1)</sup> With shaft seal

<sup>2)</sup> To DIN EN 61000-6-2 and DIN EN 61000-6-3

<sup>3)</sup> To DIN EN 60068-2-27

<sup>4)</sup> To DIN EN 60068-2-6

<sup>5)</sup> Not sealed at encoder flange

<sup>6)</sup> From the moment the supply voltage is applied, this is the time which elapses before the data word can be correctly read in.

<sup>7)</sup> (CAN High Speed) and CAN Specification 2.0 B, DC isolated

<sup>8)</sup> Should only be connected in the final device

#### Order information

#### ATM 60 CANopen blind hollow shaft; U<sub>s</sub> 10 ... 32 V


Type	Part no.	Explanation
ATM60-CAH13X13	1 030 026	Blind hollow shaft

**Attention: Please order the CANbus adaptor separately (see page 42)**

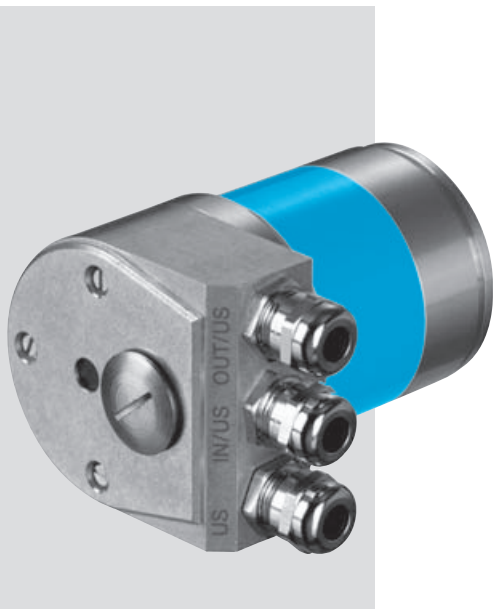
#### **1** Attention: Please order the collet with required diameter separately

Type	Part no.	Shaft diameter
SPZ-006-AD-A	2 029 174	6 mm
SPZ-1E4-AD-A	2 029 175	1/4"
SPZ-008-AD-A	2 029 176	8 mm
SPZ-3E8-AD-A	2 029 177	3/8"
SPZ-010-AD-A	2 029 178	10 mm
SPZ-012-AD-A	2 029 179	12 mm
SPZ-1E2-AD-A	2 029 180	1/2"

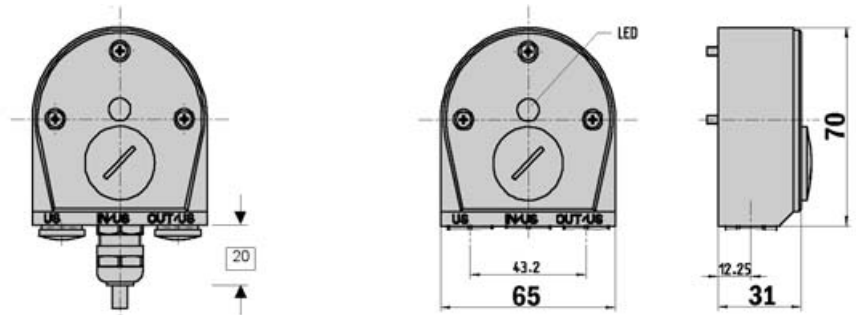
For 15 mm shaft diameter, collet is not needed

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Absolute Encoder Multiturn

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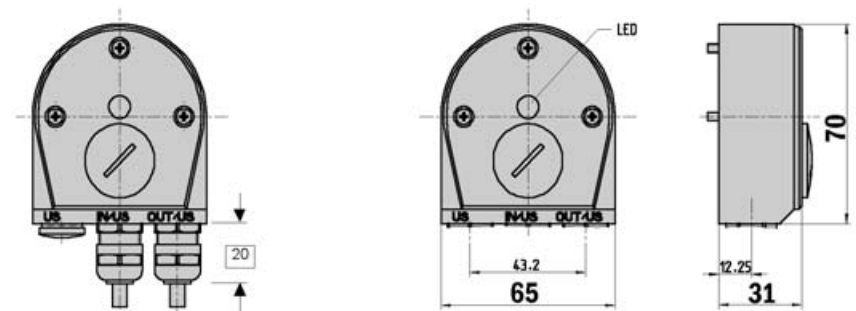


Dimensional drawing CANopen adaptor KR1



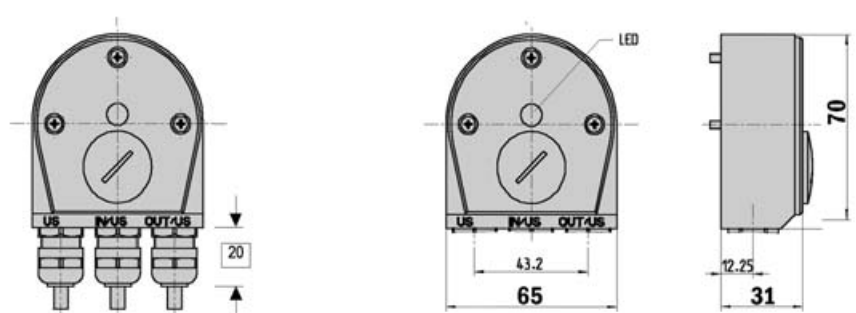
General tolerances according DIN ISO 2768-mk

Dimensional drawing CANopen adaptor KR2



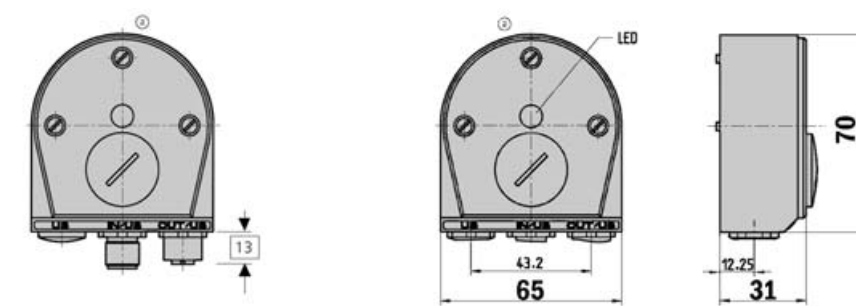
General tolerances according DIN ISO 2768-mk

Dimensional drawing CANopen adaptor KR3



General tolerances according DIN ISO 2768-mk

Dimensional drawing CANopen adaptor SR2



General tolerances according DIN ISO 2768-mk

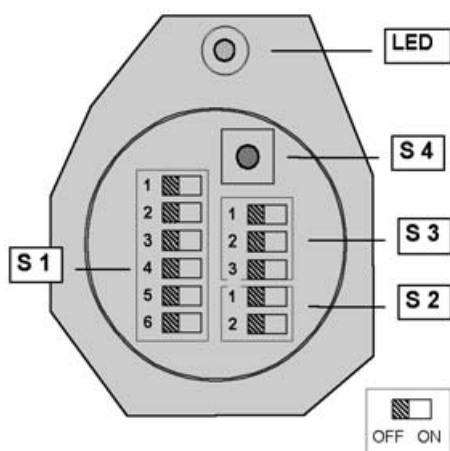
**Order information**

**ATM 60 CANopen adaptor**

Type	Part no.	Explanation
AD-ATM60-KR1CO	2 029 230	Bus adaptor KR1, 1 x PG
AD-ATM60-KR2CO	2 029 231	Bus adaptor KR2, 2 x PG
AD-ATM60-KR3CO	2 029 232	Bus adaptor KR3, 3 x PG
AD-ATM60-SR2CO	2 020 935	Bus adaptor SR2, 2 x M12, 5 pin.



## Switch settings



## Switch settings

Access to the switches is gained by opening the removable screw cap (PG) on the rear of the bus adaptor. Use of the following elements.

S 1	Address setting (Node ID)
S 2	Bus termination
S 3	Baud rate setting (Data Rate)
S 4	Preset push button (Number zero SET)

## Status information via LED

LED	2-colour red/green
	CAN Controller status

## Implementation

## CANopen Functionality

Predefined Connection Set

- Sync Object
- Emergency Object
- NMT Network Object (Error Control services, Boot-Up service)
- One Service Data Object (SDO)
- Two Process Data Object (PDO)

I/O-Operating Modes

- Synchronous: -- Depends on Sync Object
- Asynchronous: -- No reference to Sync Object. Triggered by "Timer" (Cyclic) or by event (COS)
- Remote Transmission (RTR)

## Encoder Parameters

according the Device Profile for Encoders:

- Code direction (CW, CCW)
- Scaling function (ON, OFF)
- PRESET value
- Steps per revolution (CPR) - 1 ... 8,192
- Total resolution (TR) -- 1 ... 67,108,864 steps, with  $TR = 2^n \times CPR$  -- ( $n=0 \dots 13$ )
- Limits for the working range
- Cycle Timer for asynchronous PDOs
- 8 programmable cams with HIGH/LOW limits and hysteresis
- General Diagnostic parameters (Offset Value, Alarms, Warnings, version of profile and software)

Manufacturer specific Profile:

- Node commissioning: -- Location and values for Node-ID and Baud rate
- Hysteresis to position change required for Async PDOs with COS mode
- Limits and display format for the speed and acceleration values

## PDO Data Mapping

Mapping of up to four data objects to each of the two Transmit PDOs. The resulting data length within one PDO is limited to 8 Byte.

(1) Object 1/Pos Val <sup>1)</sup>	I-1
(n) Object 2 ... Object 4	I-1 to I-7

## Input Data Objects

I-1 Position value [Pos Val]	4 Byte
I-2 Status of cam	1 Byte
I-3 Status of working range	1 Byte
I-4 Alarms	1 Byte
I-5 Warnings	1 Byte
I-6 Speed value	4 Byte
I-7 Acceleration value	4 Byte

## Setting: - Address (Node ID)

0 to 63 by Hardware (DIP Switch) or EEPROM

## Setting: - Baud rate

10kb, 20kb, 50kb, 125kb, 250kb, 500kb, 1 MB by Hardware (DIP Switch) or EEPROM

## Setting: - Bus Termination

The DIP-Switch (S2) is used to switch on/off an internal bus termination (ON/OFF). Not used (OFF) in case of using an external termination of the network

## Setting: - PRESET Value

The Preset function supports adaptation of the encoder zero point to the mechanical zero point of the encoder system. The factory PRESET value is zero [0]

The adjustment is carried out in 2 ways:

- by Hardware (PRESET push button)
- by Software (CANopen Protocol)

## Equipment Configuration

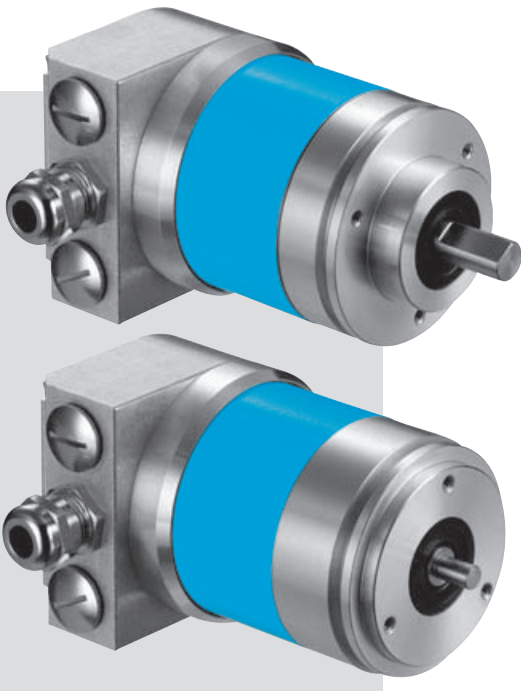
Configuring parameters of the encoder can be achieved by a configuration tool in conjunction with an EDS file (Electronic Data Sheet). It contains all the characteristics of the encoder.

<sup>1)</sup> Default Setting

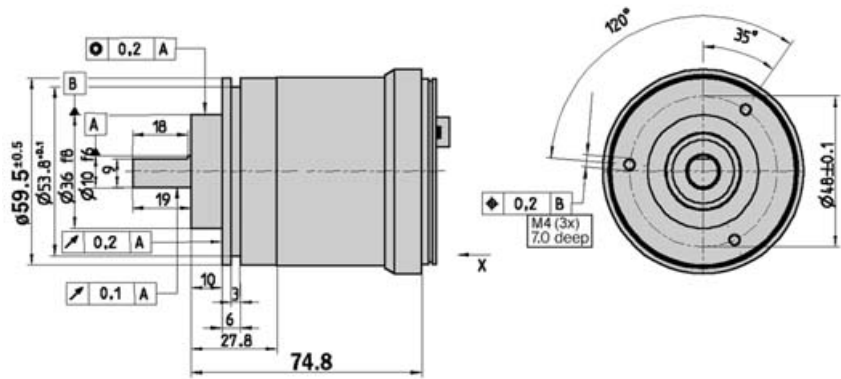


**Resolution up to 26 bits**  
 Absolute Encoder Multiturn

- Extremely robust
- Bus coupling to CAN-High speed specification
- Electronically adjustable, resolution adjustable
- Highly shock- and vibration-proof
- High degree of protection IP 67

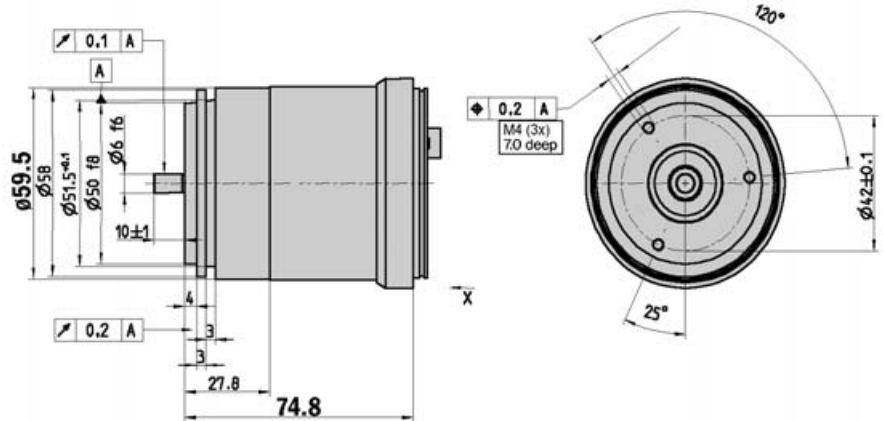


**Dimensional drawing face mount flange**



General tolerances according DIN ISO 2768-mk

**Dimensional drawing servo flange**



General tolerances according DIN ISO 2768-mk

**1 PIN and wire allocation for bus adaptor**

Terminal strip	Connector	Signal	Explanation
1	1	Shield	Screen
2	2	U <sub>s</sub> (24V)	Supply voltage 10 ... 32V
3	3	GND (COM)	0V (Gnd)
4	4	CAN <sub>H</sub>	CAN Bus Signal HIGH
5	5	CAN <sub>L</sub>	CAN Bus Signal LOW
6		CAN <sub>H</sub>	CAN Bus Signal HIGH
7		CAN <sub>L</sub>	CAN Bus Signal LOW
8		GND (COM)	0V (Gnd)
9		U <sub>s</sub> (24V)	Supply voltage 10 ... 32V

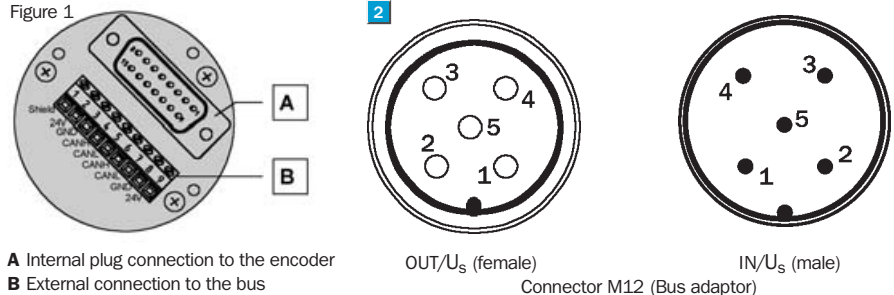


1 Encoders with a DeviceNet adaptor have a terminal strip for connecting the bus and supply lines. In order to connect the lines, the DeviceNet adaptor is unscrewed from the complete device. The figure 1 shows the pin allocation within the bus connection.

**See chapter Accessories**

Accessories for encoders

Figure 1



A Internal plug connection to the encoder  
 B External connection to the bus

OUT/U<sub>s</sub> (female)  
 IN/U<sub>s</sub> (male)  
 Connector M12 (Bus adaptor)

Technical data according to DIN 32878		ATM 60 DeviceNet		Flange type									
		face m.	servo										
<b>Solid shaft</b>	10 mm												
	6 mm												
<b>Mass</b>	Approx. 0.59 kg												
<b>Moment of inertia of the rotor</b>	35 gcm <sup>2</sup>												
<b>Measuring step</b>	0.043°												
<b>Max. number of steps per revolution</b>	8,192												
<b>Max. number of revolutions</b>	8,192												
<b>Error limits</b>	± 0.25°												
<b>Repeatability</b>	0.1°												
<b>Operating speed</b>	6,000 min <sup>-1</sup>												
<b>Position forming time</b>	0.25 ms												
<b>Max. angular acceleration</b>	5 x 10 <sup>5</sup> rad/s <sup>2</sup>												
<b>Operating torque</b>	1.8 Ncm <sup>1)</sup>												
without shaft seal <sup>1)</sup>	0.3 Ncm												
<b>Start up torque</b>	2.5 Ncm <sup>1)</sup>												
without shaft seal <sup>2)</sup>	0.5 Ncm												
<b>Max. shaft loading</b>													
radial	300 N												
axial	50 N												
<b>Bearing lifetime</b>	3.6 x 10 <sup>9</sup> revolutions												
<b>Working temperature range</b>	- 20 ... + 80 °C												
<b>Storage temperature range</b>	- 40 ... + 125 °C												
<b>Permissible relative humidity</b>	98 %												
<b>EMC <sup>3)</sup></b>													
<b>Resistance</b>													
to shocks <sup>4)</sup>	100/6 g/ms												
to vibration <sup>5)</sup>	20/10 ... 2000 g/Hz												
<b>Protection class acc. IEC 60529</b>													
with shaft seal	IP 67												
without shaft seal <sup>6)</sup>	IP 43												
without shaft seal <sup>7)</sup>	IP 66												
<b>Operating voltage range (Us)</b>	10 ... 32 V												
<b>Power consumption</b>	2.0 W												
<b>Initialisation time <sup>8)</sup></b>	1250 ms												
<b>Bus Interface DeviceNet</b>													
<b>Electrical interface <sup>9)</sup></b>	ISO-DIS 11898												
<b>Protocol</b>	DeviceNet Specification, Release 2.0												
<b>Address setting (NODE ID)</b>	0 ... 63 (DIP switches or protocol)												
<b>Data transmission rate (Data Rate)</b>	{125, 250, 500} kB (DIP switches or protocol)												
<b>Electronic adjustment (Number SET)</b>	Via PRESET push button or protocol												
<b>Status Information</b>	Network Status LED (NS), 2-colours												
<b>Bus Termination <sup>10)</sup></b>	Via DIP switches												
<b>Electrical Connection</b>	Bus adaptor <sup>11)</sup>												

<sup>1)</sup> With shaft seal

<sup>2)</sup> In case that shaft seal has been removed by customer

<sup>3)</sup> To DIN EN 61000-6-2 and DIN EN 61000-6-3

<sup>4)</sup> To DIN EN 60068-2-27

<sup>5)</sup> To DIN IEN 60068-2-6

<sup>6)</sup> Not sealed at encoder flange

<sup>7)</sup> Sealed at encoder flange

<sup>8)</sup> From the moment the supply voltage is applied, this is the time which elapses before the data word can be correctly read in.

<sup>9)</sup> (CAN High Speed) and CAN Specification 2.0 B, DC isolated

<sup>10)</sup> Should only be connected in the final device

<sup>11)</sup> For cable with PG 9 or connector (see bus adaptor)

#### Order information

#### ATM 60 DeviceNet face mount and servo flange solid shaft; U<sub>s</sub> 10 ... 32 V

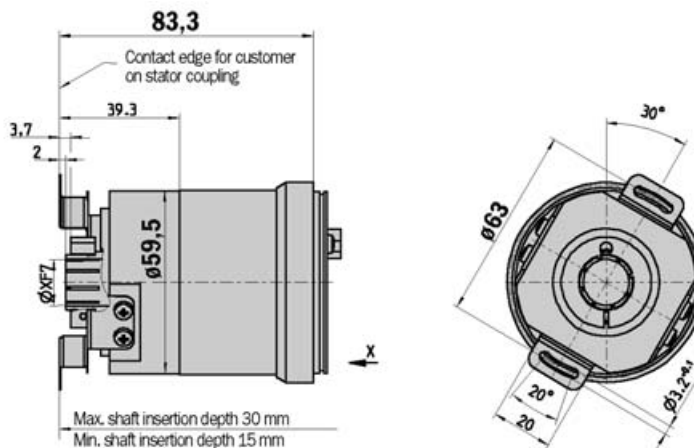
Type	Part no.	Explanation
ATM60-D4H13X13	1 030 017	Face mount solid shaft Ø 10 mm
ATM60-D1H13X13	1 030 018	Servo flange solid shaft Ø 6 mm

**Attention: Please order the DeviceNet adaptor separately (see page 48)**

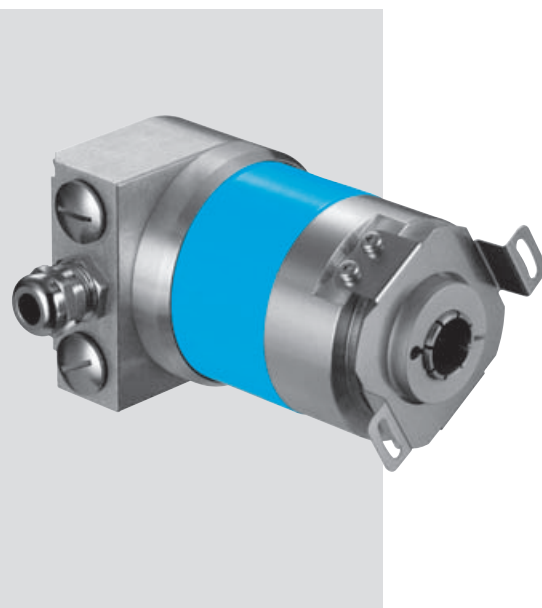
**Resolution up to 26 bits**  
**Absolute Encoder Multiturn**

- Extremely robust
- Bus coupling to CAN-High speed specification
- Electronically adjustable, resolution adjustable
- Highly shock- and vibration-proof
- High degree of protection IP 67

### Dimensional drawing blind hollow shaft

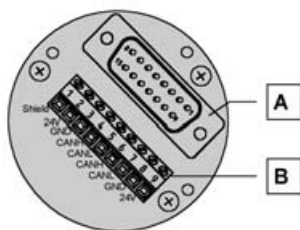


General tolerances according DIN ISO 2768-mk



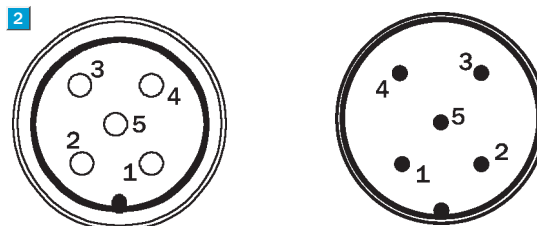
### 1 PIN and wire allocation for bus adaptor

Terminal strip	Connector	Signal	Explanation
1	1	Shield	Screen
2	2	U <sub>s</sub> (24 V)	Supply voltage 10 ... 32 V
3	3	GND (COM)	0V (Gnd)
4	4	CAN <sub>H</sub>	CAN Bus Signal HIGH
5	5	CAN <sub>L</sub>	CAN Bus Signal LOW
6		CAN <sub>H</sub>	CAN Bus Signal HIGH
7		CAN <sub>L</sub>	CAN Bus Signal LOW
8		GND (COM)	0V (Gnd)
9		U <sub>s</sub> (24 V)	Supply voltage 10 ... 32 V



1 Encoders with a DeviceNet adaptor have a terminal strip for connecting the bus and supply lines. In order to connect the lines, the DeviceNet adaptor is unscrewed from the complete device. The figure shows the pin allocation within the bus connection.

A Internal plug connection to the encoder  
 B External connection to the bus



OUT/U<sub>s</sub> (female)      IN/U<sub>s</sub> (male)  
 Connector M12 (Bus adaptor)

See chapter Accessories  
 Accessories for encoders




Technical data according to DIN 32878		ATM 60 DeviceNet		Flange type					
				blind					
<b>1 Hollow shaft diameter</b>	6, 8, 10, 12, 15 mm, 1/4", 3/8", 1/2"								
<b>Mass</b>	Approx. 0.59 kg								
<b>Moment of inertia of the rotor</b>	55 gcm <sup>2</sup>								
<b>Measuring step</b>	0.043°								
<b>Max. number of steps per revolution</b>	8,192								
<b>Max. number of revolutions</b>	8,192								
<b>Error limits</b>	± 0,25°								
<b>Repeatability</b>	0.1°								
<b>Operating speed</b>	3,000 min <sup>-1</sup>								
<b>Position forming time</b>	0.25 ms								
<b>Max. angular acceleration</b>	5 x 10 <sup>5</sup> rad/s <sup>2</sup>								
<b>Operating torque</b>	0.8 Ncm <sup>1)</sup>								
<b>Start up torque</b>	1.2 Ncm <sup>1)</sup>								
<b>Permissible shaft movement of the drive element</b>									
radial static/dynamic	± 0.3/± 0.1 mm								
axial static/dynamic	± 0.5/± 0.2 mm								
<b>Bearing lifetime</b>	3.6 x 10 <sup>9</sup> revolutions								
<b>Working temperature range</b>	- 20 ... + 80 °C								
<b>Storage temperature range</b>	- 40 ... + 125 °C								
<b>Permissible relative humidity</b>	98 %								
<b>EMC <sup>2)</sup></b>									
<b>Resistance</b>									
to shocks <sup>3)</sup>	100/6 g/ms								
to vibration <sup>4)</sup>	20 /10 ... 2000 g/Hz								
<b>Protection class acc. IEC 60529 <sup>1)</sup></b>	IP 67								
without shaft seal <sup>5)</sup>	IP 43								
<b>Operating voltage range (Us)</b>	10 ... 32 V								
<b>Power consumption</b>	2.0 W								
<b>Initialisation time <sup>6)</sup></b>	1250 ms								
<b>Bus Interface DeviceNet</b>									
<b>Electrical interface <sup>7)</sup></b>	ISO-DIS 11898								
<b>Protocol</b>	DeviceNet Specification, Release 2.0								
<b>Address setting (NODE ID)</b>	0 ... 63 (DIP switches or protocol)								
<b>Data transmission rate (Data Rate)</b>	{125, 250, 500} kB (DIP switches or protocol)								
<b>Electronic adjustment (Number SET)</b>	Via PRESET push button or protocol								
<b>Status Information</b>	Network Status LED (NS), 2-colours								
<b>Bus Termination <sup>8)</sup></b>	Via DIP switches								
<b>Electrical Connection</b>	Bus adaptor <sup>9)</sup>								

- <sup>1)</sup> With shaft seal
- <sup>2)</sup> To DIN EN 61000-6-2 and DIN EN 61000-6-3
- <sup>3)</sup> To DIN EN 60068-2-27
- <sup>4)</sup> To DIN EN 60068-2-6
- <sup>5)</sup> Not sealed at encoder flange
- <sup>6)</sup> From the moment the supply voltage is applied, this is the time which elapses before the data word can be correctly read in
- <sup>7)</sup> (CAN High Speed) and CAN Specification 2.0 B, DC isolated
- <sup>8)</sup> Should only be connected in the final device
- <sup>9)</sup> For cable with PG 9 or connector (see bus adaptor)

Order information		
<b>ATM 60 DeviceNet blind hollow shaft; U<sub>s</sub> 10 ... 32 V</b>		
Type	Part no.	Explanation
ATM60-DAH13X13	1 030 019	Blind hollow shaft
<b>Attention: Please order the DeviceNet adaptor separately (see page 48)</b>		

<b>1 Attention: Please order the collet with required diameter separately</b>		
Type	Part no.	Shaft diameter
SPZ-006-AD-A	2 029 174	6 mm
SPZ-1E4-AD-A	2 029 175	1/4"
SPZ-008-AD-A	2 029 176	8 mm
SPZ-3E8-AD-A	2 029 177	3/8"
SPZ-010-AD-A	2 029 178	10 mm
SPZ-012-AD-A	2 029 179	12 mm
SPZ-1E2-AD-A	2 029 180	1/2"
For 15 mm shaft diameter, collet is not needed		

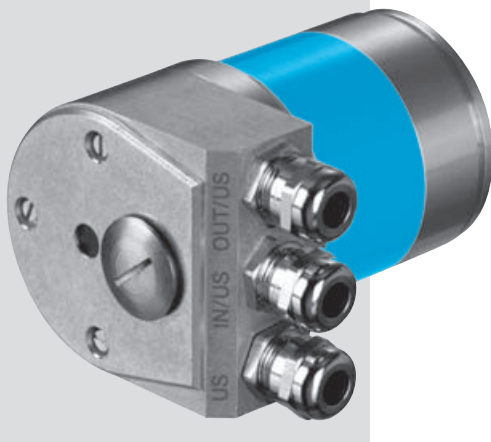




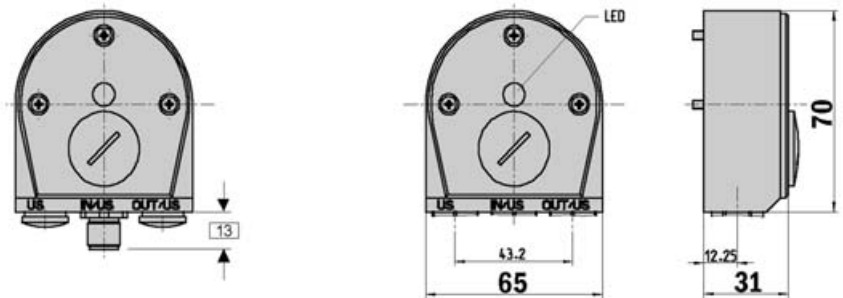
**Resolution up to 26 bits**

Absolute Encoder Multiturn

- Extremely robust
- Bus coupling to CAN-High speed specification
- Electronically adjustable, resolution adjustable
- Highly shock- and vibration-proof
- High degree of protection IP 67

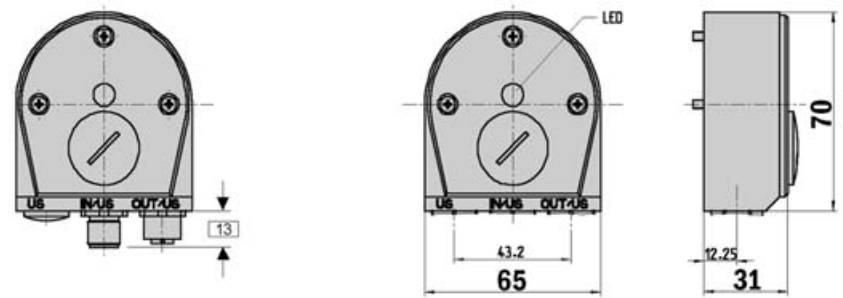


Dimensional drawing DeviceNet adaptor SR1



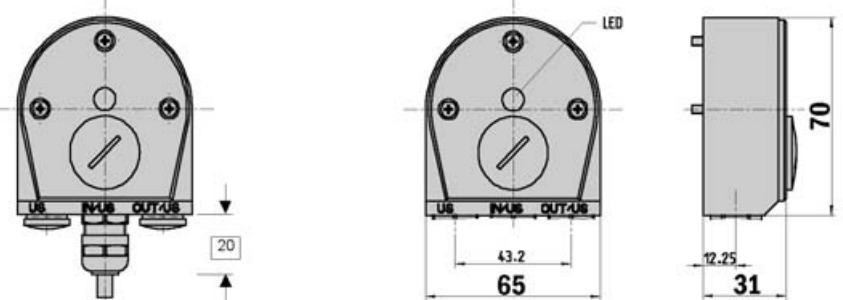
General tolerances according DIN ISO 2768-mk

Dimensional drawing DeviceNet adaptor SR2



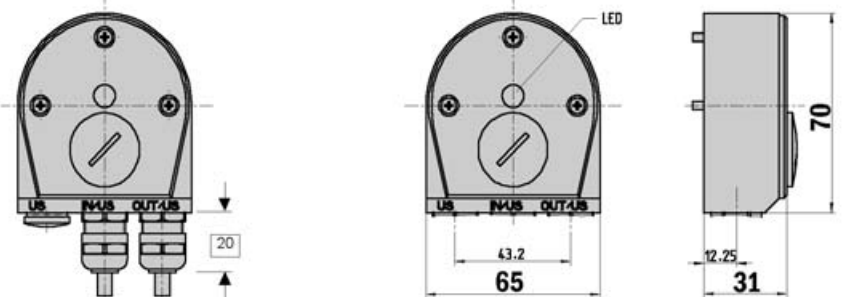
General tolerances according DIN ISO 2768-mk

Dimensional drawing DeviceNet adaptor KR1

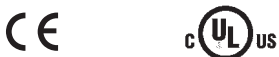


General tolerances according DIN ISO 2768-mk

Dimensional drawing DeviceNet adaptor KR2



General tolerances according DIN ISO 2768-mk



See chapter Accessories

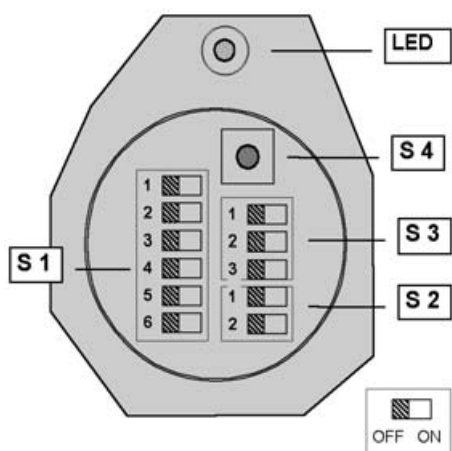
Accessories for encoders

**Order information**

**ATM 60 DeviceNet adaptor**

Type	Part no.	Explanation
AD-ATM60-SR1DN	2 029 226	Bus adaptor SR1, 1 x M12, 5 pin
AD-ATM60-SR2DN	2 029 227	Bus adaptor SR2, 2 x M12, 5 pin
AD-ATM60-KR1DN	2 029 228	Bus adaptor KR1, 1 x PG
AD-ATM60-KR2DN	2 029 229	Bus adaptor KR2, 2 x PG

## Switch settings



## Switch settings

Access to the switches is gained by opening the removable screw cap (PG) on the rear of the bus adaptor. Use of the following elements.

S 1	Address setting (Node ID)
S 2	Bus termination
S 3	Baud rate setting (Data Rate)
S 4	Preset push button (Number zero SET)

## Status information (NS) via LED

LED	2-colour red/green
	Network communication status

## Implementation

## DN Functionality

Object model

- Identity Object
- Message Router Object
- DeviceNet Object
- Assembly Object
- Connection Object
- Acknowledge Handler Object
- Encoder Object

I/O-Operating Modes

- Polling
- Change of State/Cyclic
- Bits Strobe

## Encoder Parameters

according the Device Profile for Encoders:

- Code direction (CW, CCW)
- Scaling function (ON, OFF)
- PRESET value
- Hysteresis to position change of required for COS communication
- Steps per revolution (CPR) - 1 ... 8,192
- Total resolution (TR) -- 1 ... 67,108,864 steps, with  $TR = 2^n \times CPR$  -- ( $n=0 \dots 13$ )
- Limits for the working range (software limit switches)
- Limits and display format for the speed and acceleration values
- 8 programmable cams with HIGH/LOW limits and hysteresis
- General Diagnostic parameters (Offset Value, Alarms, Warnings, version of profile and software)

Manufacturer specific parameters:

- Assignment of the I/O Data Assembly to the different I/O operating modes
- Diagnostic data indicating the current maximum results of the encoder
- Device-specific data

## I/O Data Assembly

1) Pos Val (Position Value) <sup>1)</sup>	I-1
2) Pos Val + Flag	I-1, I-2
3) Pos Val + Speed	I-1, I-3
4) Pos Val + Status of Cam	I-1, I-4

## Input Data Objects

I-1 Position value [Pos Val]	4 Byte
I-2 Flag (Alarm, Warning)	1 Byte
I-3 Speed	4 Byte
I-4 Status of cam	1 Byte

## Setting: - Address (Node ID)

0 to 63 by Hardware (DIP Switch)

## Setting: - Baud rate

125kb, 250kb, 500kb by Hardware (DIP Switch)

## Setting: - Bus Termination

The DIP Switch (S2) is used to switch on/off an internal bus termination (ON/OFF). Not used (OFF) in case of using an external termination of the network

## Setting: - PRESET Value

The Preset function supports adaptation of the encoder zero point to the mechanical zero point of the encoder system. The factory PRESET value is zero [0]

The adjustment is carried out in 2 ways:

- by Hardware (PRESET push button)
- by Software (DeviceNet Protocol)

## Equipment Configuration

Configuring parameters of the encoder can be achieved by a configuration tool in conjunction with an EDS file (Electronic Data Sheet). It contains all the characteristics of the encoder.

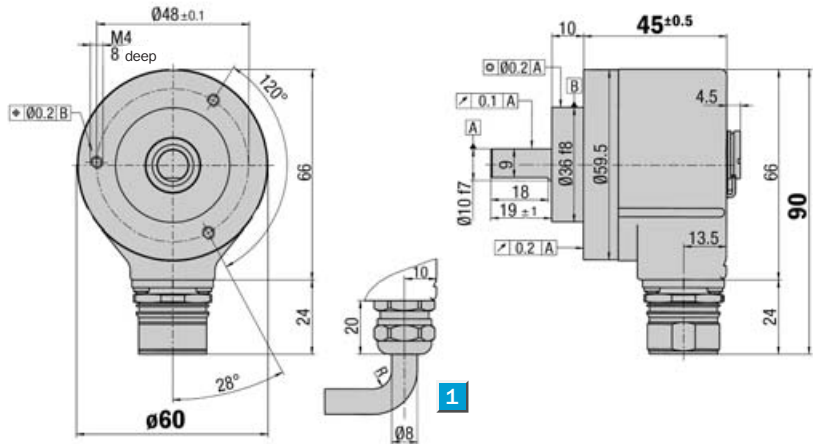
<sup>1)</sup> Default Setting

**Number of steps**  
**2 to 32,768**

Absolute Encoder Singleturn

- Connector or cable outlet
- Protection class up to IP 66
- Electrical Interfaces  
SSI or Parallel
- Zero adjustment directly on  
the encoder or via a remote line

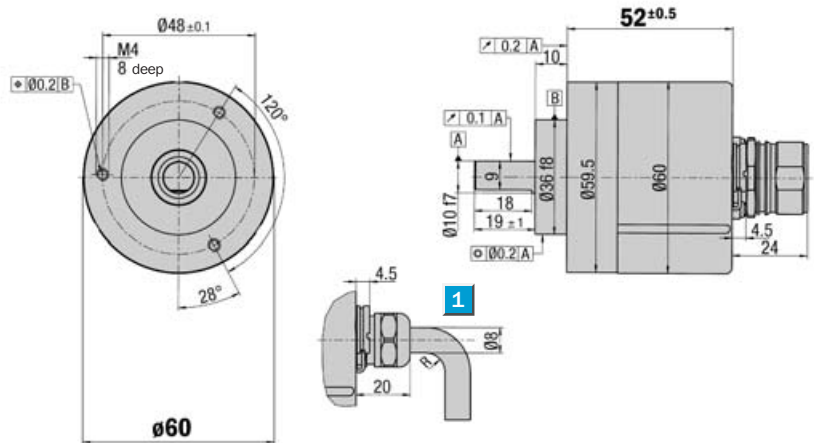
### Dimensional drawing face mount flange radial exit



**1** R = bending radius min. 40 mm

General tolerances according to DIN ISO 2768-mk

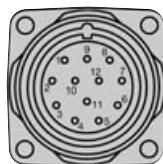
### Dimensional drawing face mount flange axial exit



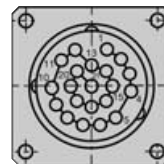
**1** R = bending radius min. 40 mm

General tolerances according to DIN ISO 2768-mk

### PIN and wire allocation see page 66



View of the connector M23 fitted to the encoder body SSI



View of the connector M23 fitted to the encoder body Single, Parallel



### See chapter Accessories

Accessories for encoders

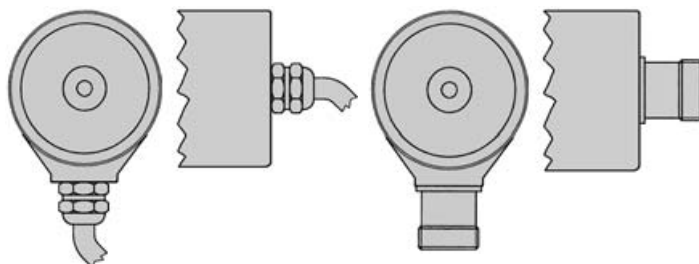
### Connection type

Radial cable

Axial cable

Radial connector

Axial connector



Technical Data acc. to DIN 32878		ARS 60 face mount flange	Flange type											
			face m.											
<b>Solid shaft</b>	10 mm													
<b>Number of steps per revolution</b>	00002 ... 32,768, see ordering information													
<b>Electrical interfaces</b>	SSI or Parallel													
<b>Mass <sup>1)</sup></b>	Approx. 0.3 kg													
<b>Moment of inertia of the rotor</b>	54 gcm <sup>2</sup>													
<b>Code direction <sup>2)</sup></b>	CW													
<b>Measurement range</b>	1 revolution													
<b>Measuring step</b>	360°/number of steps													
<b>Repeatability</b>	0.005°													
<b>Error limits</b>														
binary number of steps	0.035°													
non-binary number of steps	0.046°													
<b>Measuring step deviation</b>														
binary number of steps	0.005°													
non-binary number of steps	0.016°													
<b>Measured value backlash</b>	0.005°													
<b>Response threshold</b>	0.003°													
<b>Max. angular acceleration</b>	5 x 10 <sup>5</sup> rad/s <sup>2</sup>													
<b>Max. operating speed</b>														
with shaft seal	6,000 min <sup>-1</sup>													
without shaft seal <sup>3)</sup>	10,000 min <sup>-1</sup>													
<b>Operating torque</b>	Typ. 0.3 Ncm													
<b>Start up torque</b>	Typ. 0.4 Ncm													
<b>Permissible shaft loading</b>														
radial	20 N													
axial	10 N													
<b>Bearing lifetime</b>	3.6 x 10 <sup>9</sup> revolutions													
<b>Working temperature range</b>	- 20 ... + 85 °C													
<b>Storage temperature range</b>	- 40 ... + 100 °C													
<b>Permissible relative humidity <sup>4)</sup></b>	90 %													
<b>EMC <sup>5)</sup></b>														
<b>Resistance</b>														
to shocks <sup>6)</sup>	50/11 g/ms													
to vibration <sup>7)</sup>	20/10 ... 2000 g/Hz													
<b>Protection class acc. IEC 60529</b>														
connector outlet <sup>8)</sup>	IP 65													
cable outlet	IP 66													
<b>Operating voltage range (U<sub>s</sub>)</b>	10 ... 32 V													
<b>Operating current</b>														
SSI	Typ. 60 mA													
Parallel	Typ. 90 mA													
<b>Switching level of the control inputs</b>														
	Logic H = 0.7 x U <sub>s</sub>													
	Logic L = 0 V ... 0.3 x U <sub>s</sub>													
<b>Operation of zero-set <sup>9)</sup></b>	≥ 100 ms													
<b>Initialisation time after power on</b>	40 ms													

<sup>1)</sup> For an encoder with connector outlet

<sup>2)</sup> Increasing when viewing the clockwise rotating shaft

<sup>3)</sup> If the shaft seal has been removed by the customer

<sup>4)</sup> Condensation not permitted

<sup>5)</sup> To DIN EN 61000-6-2 and DIN EN 61000-6-3

<sup>6)</sup> To DIN EN 60068-2-27

<sup>7)</sup> To DIN EN 60068-2-6

<sup>8)</sup> With mating connector fitted

<sup>9)</sup> Only with shaft stationary (note initialisation time)



# Absolute Encoder Singleturn ARS 60 SSI and Parallel, face mount flange

## Order information SSI interface

### Absolute Encoder Singleturn ARS 60 SSI, face mount flange, solid shaft 10 mm

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>								

<b>Electrical interface</b>	<b>Mechanical interface</b>	<b>Connection type</b>	<b>Resolution</b>
10 ... 32 V, SSI, Gray = <b>A</b>	Face mount flange, solid shaft 10 mm = <b>4</b>	Connector M23, 12 pin, radial = <b>A</b>	Any number of steps from 00002 up to 32,768 possible. Always 5 characters in clear text.
10 ... 32 V, SSI, Gray Excess = <b>B</b>		Connector M23, 12 pin, axial = <b>B</b>	
		Cable 11 core, radial 1.5 m = <b>K</b>	
		Cable 11 core, radial 3 m = <b>L</b>	
		Cable 11 core, radial 5 m = <b>M</b>	
		Cable 11 core, axial 1.5 m = <b>R</b>	
		Cable 11 core, axial 3 m = <b>S</b>	
		Cable 11 core, axial 5 m = <b>T</b>	

### Order example: Absolute Encoder Singleturn ARS 60 SSI

10 ... 32 V, SSI, Gray; face mount flange; connector M23, 12 pin, radial; number of steps: 8,192

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>	<b>A</b>	<b>4</b>	<b>A</b>	<b>0</b>	<b>8</b>	<b>1</b>	<b>9</b>	<b>2</b>

### Please enter your individual encoder here

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>								

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>								

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>								

**Order information Parallel interface**

**Absolute Encoder Singleturn ARS 60 Parallel, face mount flange, solid shaft 10 mm**

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>								

<p><b>Electrical interface</b></p> <p>10 ... 32 V, parallel, Gray = <b>F</b></p> <p>10 ... 32 V, parallel, Gray Exc. = <b>G</b></p> <p>10 ... 32 V, parallel, BIN = <b>H</b></p> <p>10 ... 32 V, parallel, BCD = <b>J</b></p>	<p><b>Mechanical interface</b></p> <p>Face mount flange, solid shaft 10 mm = <b>4</b></p>	<p><b>Connection type</b></p> <p>Connector M23, 21 pin, radial = <b>A</b></p> <p>Connector M23, 21 pin, axial = <b>B</b></p> <p>Cable 22 core, radial 1.5 m = <b>K</b></p> <p>Cable 22 core, radial 3 m = <b>L</b></p> <p>Cable 22 core, radial 5 m = <b>M</b></p> <p>Cable 22 core, axial 1.5 m = <b>R</b></p> <p>Cable 22 core, axial 3 m = <b>S</b></p> <p>Cable 22 core, axial 5 m = <b>T</b></p>	<p><b>Resolution</b></p> <p>Any number of steps from 00002 up to 32,768 possible, with the following electrical interfaces:</p> <p>10 ... 32 V, parallel, Gray</p> <p>10 ... 32 V, parallel, Gray Excess</p> <p>10 ... 32 V, parallel, BIN</p> <p>Number of steps from 00002 up to 07999 possible, with the electrical interface:</p> <p>10 ... 32 V, parallel, BCD</p> <p>Always 5 characters in clear text.</p>
---	---	---	---

**Order example: Absolute Encoder Singleturn ARS 60 Parallel**

**10 ... 32 V, Parallel, Gray; face mount flange; connector M23, 21 pin, radial; number of steps: 8,192**

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>	<b>F</b>	<b>4</b>	<b>A</b>	<b>0</b>	<b>8</b>	<b>1</b>	<b>9</b>	<b>2</b>

**Please enter your individual encoder here**

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>								

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>								

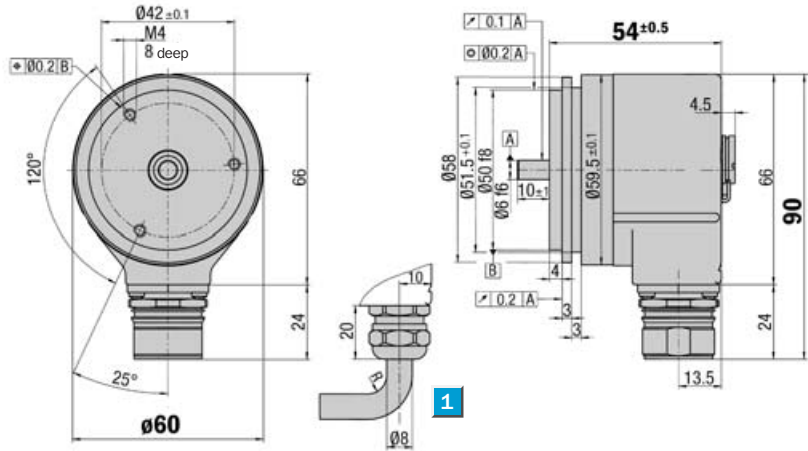
Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>								

**Number of steps**  
**2 to 32,768**

Absolute Encoder Singleturn

- Connector or cable outlet
- Protection class up to IP 66
- Electrical Interfaces  
SSI or Parallel
- Zero adjustment directly on  
the encoder or via a remote line

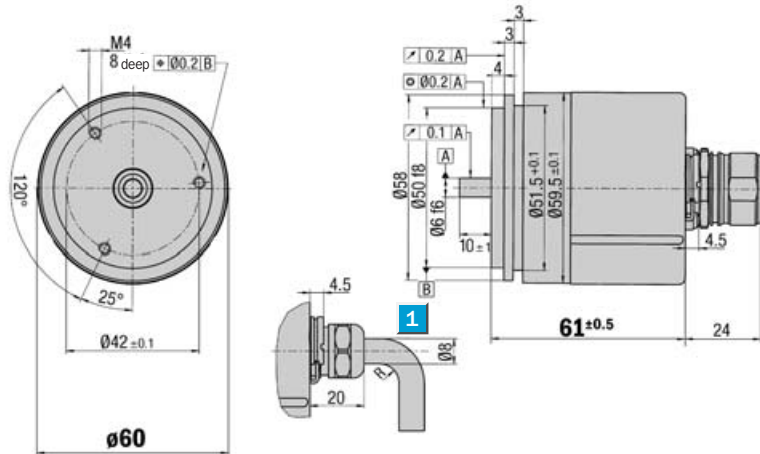
### Dimensional drawing servo flange radial exit



**1** R = bending radius min. 40 mm

General tolerances according to DIN ISO 2768-mk

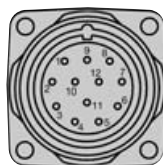
### Dimensional drawing servo flange axial exit



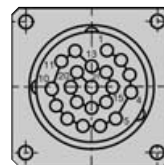
**1** R = bending radius min. 40 mm

General tolerances according to DIN ISO 2768-mk

### PIN and wire allocation see page 66



View of the connector M23 fitted to the encoder body SSI



View of the connector M23 fitted to the encoder body Single, Parallel

### See chapter Accessories

Accessories for encoders

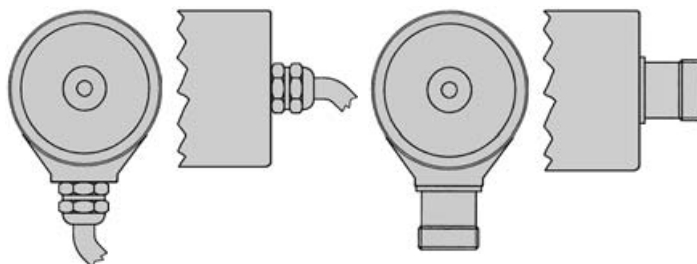
### Connection type

Radial cable

Axial cable

Radial connector

Axial connector



Technical Data acc. to DIN 32878		ARS 60 servo flange	Flange type											
			servo											
<b>Solid shaft</b>	6 mm													
<b>Number of steps per revolution</b>	00002 ... 32,768, see ordering information													
<b>Electrical interfaces</b>	SSI or Parallel													
<b>Mass <sup>1)</sup></b>	Approx. 0.3 kg													
<b>Moment of inertia of the rotor</b>	48 gcm <sup>2</sup>													
<b>Code direction <sup>2)</sup></b>	CW													
<b>Measurement range</b>	1 revolution													
<b>Measuring step</b>	360°/number of steps													
<b>Repeatability</b>	0.005°													
<b>Error limits</b>														
binary number of steps	0.035°													
non-binary number of steps	0.046°													
<b>Measuring step deviation</b>														
binary number of steps	0.005°													
non-binary number of steps	0.016°													
<b>Measured value backlash</b>	0.005°													
<b>Response threshold</b>	0.003°													
<b>Max. angular acceleration</b>	5 x 10 <sup>5</sup> rad/s <sup>2</sup>													
<b>Max. operating speed</b>														
with shaft seal	6,000 min <sup>-1</sup>													
without shaft seal <sup>3)</sup>	10,000 min <sup>-1</sup>													
<b>Operating torque</b>	Typ. 0.2 Ncm													
<b>Start up torque</b>	Typ. 0.25 Ncm													
<b>Permissible shaft loading</b>														
radial	20 N													
axial	10 N													
<b>Bearing lifetime</b>	3.6 x 10 <sup>9</sup> revolutions													
<b>Working temperature range</b>	- 20 ... + 85 °C													
<b>Storage temperature range</b>	- 40 ... + 100 °C													
<b>Permissible relative humidity <sup>4)</sup></b>	90 %													
<b>EMC <sup>5)</sup></b>														
<b>Resistance</b>														
to shocks <sup>6)</sup>	50/11 g/ms													
to vibration <sup>7)</sup>	20/10 ... 2000 g/Hz													
<b>Protection class acc. IEC 60529</b>														
connector outlet <sup>8)</sup>	IP 65													
cable outlet	IP 66													
<b>Operating voltage range (U<sub>s</sub>)</b>	10 ... 32 V													
<b>Operating current</b>														
SSI	Typ. 60 mA													
Parallel	Typ. 90 mA													
<b>Switching level of the control inputs</b>														
	Logic H = 0.7 x U <sub>s</sub>													
	Logic L = 0 V ... 0.3 x U <sub>s</sub>													
<b>Operation of zero-set <sup>9)</sup></b>	≥ 100 ms													
<b>Initialisation time after power on</b>	40 ms													

<sup>1)</sup> For an encoder with connector outlet

<sup>2)</sup> Increasing when viewing the clockwise rotating shaft

<sup>3)</sup> If the shaft seal has been removed by the customer

<sup>4)</sup> Condensation not permitted

<sup>5)</sup> To DIN EN 61000-6-2 and DIN EN 61000-6-3

<sup>6)</sup> To DIN EN 60068-2-27

<sup>7)</sup> To DIN EN 60068-2-6

<sup>8)</sup> With mating connector fitted

<sup>9)</sup> Only with shaft stationary (note initialisation time)

# Absolute Encoder Singleturn ARS 60 SSI and Parallel, servo flange

## Order information SSI interface

### Absolute Encoder Singleturn ARS 60 SSI, servo flange, solid shaft 6 mm

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>								

Electrical interface	Mechanical interface	Connection type	Resolution
10 ... 32 V, SSI, Gray = <b>A</b>	Servo flange, solid shaft 6 mm = <b>1</b>	Connector M23, 12 pin, radial = <b>A</b>	Any number of steps from 00002 up to 32,768 possible. Always 5 characters in clear text.
10 ... 32 V, SSI, Gray Excess = <b>B</b>		Connector M23, 12 pin, axial = <b>B</b>	
		Cable 11 core, radial 1.5 m = <b>K</b>	
		Cable 11 core, radial 3 m = <b>L</b>	
		Cable 11 core, radial 5 m = <b>M</b>	
		Cable 11 core, axial 1.5 m = <b>R</b>	
		Cable 11 core, axial 3 m = <b>S</b>	
		Cable 11 core, axial 5 m = <b>T</b>	

### Order example: Absolute Encoder Singleturn ARS 60 SSI

10 ... 32 V, SSI, Gray; servo flange; connector M23, 12 pin, radial; number of steps: 8,192

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>	<b>A</b>	<b>1</b>	<b>A</b>	<b>0</b>	<b>8</b>	<b>1</b>	<b>9</b>	<b>2</b>

### Please enter your individual encoder here

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>								

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>								

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>								



**Order information Parallel Interface**

**Absolute Encoder Singleturn ARS 60 Parallel, servo flange, solid shaft 6 mm**

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>								

Electrical interface	Mechanical interface	Connection type	Resolution
10 ... 32 V, parallel, Gray = <b>F</b>	Servo flange, solid shaft 6 mm = <b>1</b>	Connector M23, 21 pin, radial = <b>A</b>	Any number of steps from 00002 up to 32,768 possible, with the following electrical interfaces: 10 ... 32 V, parallel, Gray 10 ... 32 V, parallel, Gray Excess 10 ... 32 V, parallel, BIN
10 ... 32 V, parallel, Gray Exc. = <b>G</b>		Connector M23, 21 pin, axial = <b>B</b>	
10 ... 32 V, parallel, BIN = <b>H</b>	Cable 22 core, radial 1.5 m = <b>K</b>	Number of steps from 00002 up to 07999 possible, with the electrical interface: 10 ... 32 V, parallel, BCD Always 5 characters, in clear text.	
10 ... 32 V, parallel, BCD = <b>J</b>	Cable 22 core, radial 3 m = <b>L</b>		
	Cable 22 core, radial 5 m = <b>M</b>		
	Cable 22 core, axial 1.5 m = <b>R</b>		
		Cable 22 core, axial 3 m = <b>S</b>	
		Cable 22 core, axial 5 m = <b>T</b>	

**Order example: Absolute Encoder Singleturn ARS 60 Parallel**

**10 ... 32 V, Parallel, Gray; servo flange; connector M23, 21 pin, radial; number of steps: 8,192**


Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>	<b>F</b>	<b>1</b>	<b>A</b>	<b>0</b>	<b>8</b>	<b>1</b>	<b>9</b>	<b>2</b>

**Please enter your individual encoder here**

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>								

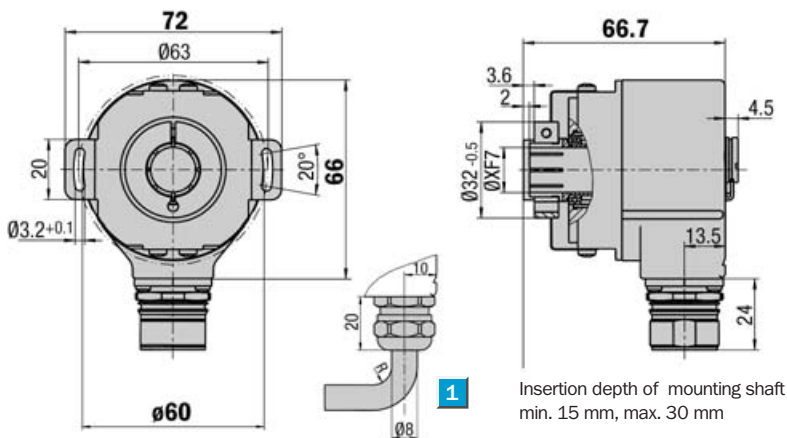
Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>								

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>								

 **Number of steps**  
**2 to 32,768**  
Absolute Encoder Singleturn

- Connector or cable outlet
- Protection class up to IP 66
- Electrical Interfaces  
SSI or Parallel
- Zero adjustment directly on  
the encoder or via a remote line

**Dimensional drawing blind hollow shaft radial exit**

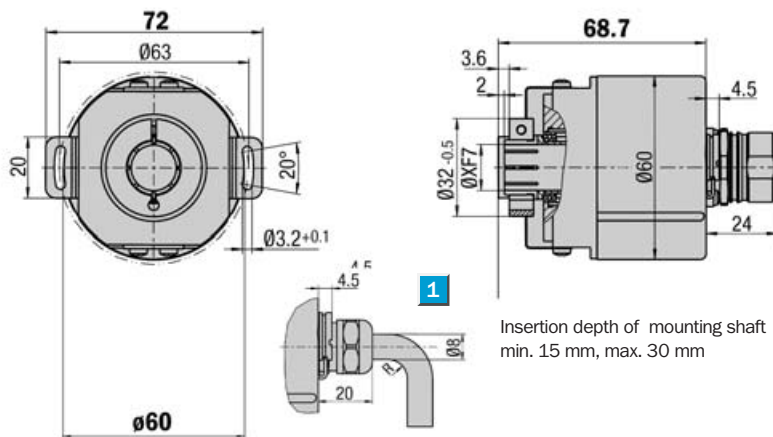


Insertion depth of mounting shaft  
min. 15 mm, max. 30 mm

1 R = bending radius min. 40 mm

General tolerances according to DIN ISO 2768-mk

**Dimensional drawing blind hollow shaft axial exit**

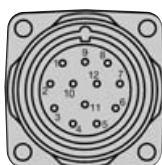
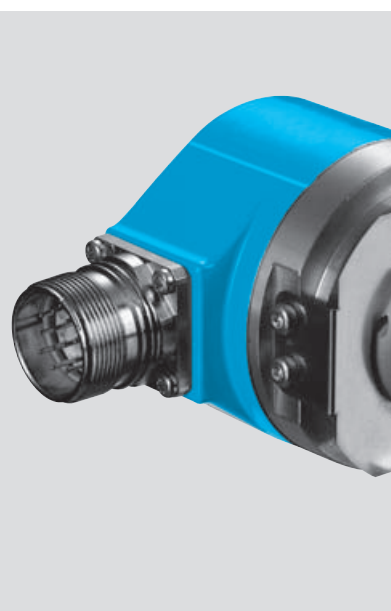


Insertion depth of mounting shaft  
min. 15 mm, max. 30 mm

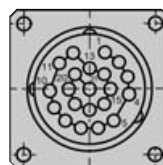
1 R = bending radius min. 40 mm

General tolerances according to DIN ISO 2768-mk

**PIN and wire allocation see page 66**



View of the connector M23 fitted to the  
encoder body SSI

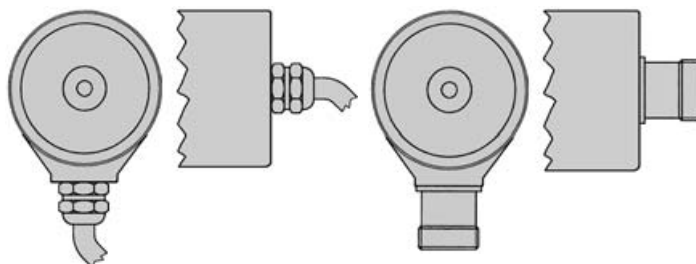


View of the connector M23 fitted to the  
encoder body Single, Parallel

**See chapter Accessories**  
Accessories for encoders

**Connection type**

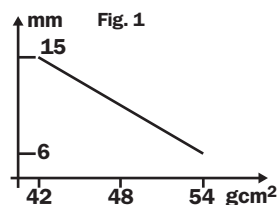
- |              |             |                  |                 |
|--------------|-------------|------------------|-----------------|
| Radial cable | Axial cable | Radial connector | Axial connector |
|--------------|-------------|------------------|-----------------|



Technical Data acc. to DIN 32878		ARS 60 blind hollow shaft								Flange type			
										blind			
<b>Hollow shaft diameter</b>	6, 8, 10, 12, 15 mm, 1/4", 3/8", 1/2"												
<b>Number of steps per revolution</b>	00002 ... 32,768, see ordering information												
<b>Electrical interfaces</b>	SSI or Parallel												
<b>Mass <sup>4)</sup></b>	Approx. 0.3 kg												
<b>Moment of inertia of the rotor</b>	See Fig. 1												
<b>Code direction <sup>2)</sup></b>	CW												
<b>Measurement range</b>	1 revolution												
<b>Measuring step</b>	360°/number of steps												
<b>Repeatability</b>	0.005°												
<b>Error limits</b>													
binary number of steps	0.035°												
non-binary number of steps	0.046°												
<b>Measuring step deviation</b>													
binary number of steps	0.005°												
non-binary number of steps	0.016°												
<b>Measured value backlash</b>	0.005°												
<b>Response threshold</b>	0.003°												
<b>Max. angular acceleration</b>	5 x 10 <sup>5</sup> rad/s <sup>2</sup>												
<b>Max. operating speed</b>	3,000 min <sup>-1</sup>												
<b>Operating torque</b>	Typ. 0.4 Ncm												
<b>Start up torque</b>	Typ. 0.6 Ncm												
<b>Permissible movement of the drive element</b>													
radial movement static/dynamic	± 0.3/± 0.1 mm												
axial movement static/dynamic	± 0.5/± 0.2 mm												
<b>Bearing lifetime</b>	3.6 x 10 <sup>9</sup> revolutions												
<b>Working temperature range</b>	- 20 ... + 85 °C												
<b>Storage temperature range</b>	- 40 ... + 100 °C												
<b>Permissible relative humidity <sup>3)</sup></b>	90 %												
<b>EMC <sup>4)</sup></b>													
<b>Resistance</b>													
to shocks <sup>5)</sup>	50/11 g/ms												
to vibration <sup>6)</sup>	20/10 ... 2000 g/Hz												
<b>Protection class acc. IEC 60529</b>													
connector outlet <sup>7)</sup>	IP 65												
cable outlet	IP 66												
<b>Operating voltage range (Us)</b>	10 ... 32 V												
<b>Operating current</b>													
SSI	Typ. 60 mA												
Parallel	Typ. 90 mA												
<b>Switching level of the control inputs</b>													
	Logic H = 0.7 x U <sub>s</sub>												
	Logic L = 0 V ... 0.3 x U <sub>s</sub>												
<b>Operation of zero-set <sup>8)</sup></b>	≥ 100 ms												
<b>Initialisation time after power on</b>	40 ms												

1) For an encoder with connector outlet  
 2) Increasing when viewing the clockwise rotating shaft  
 3) Condensation not permitted

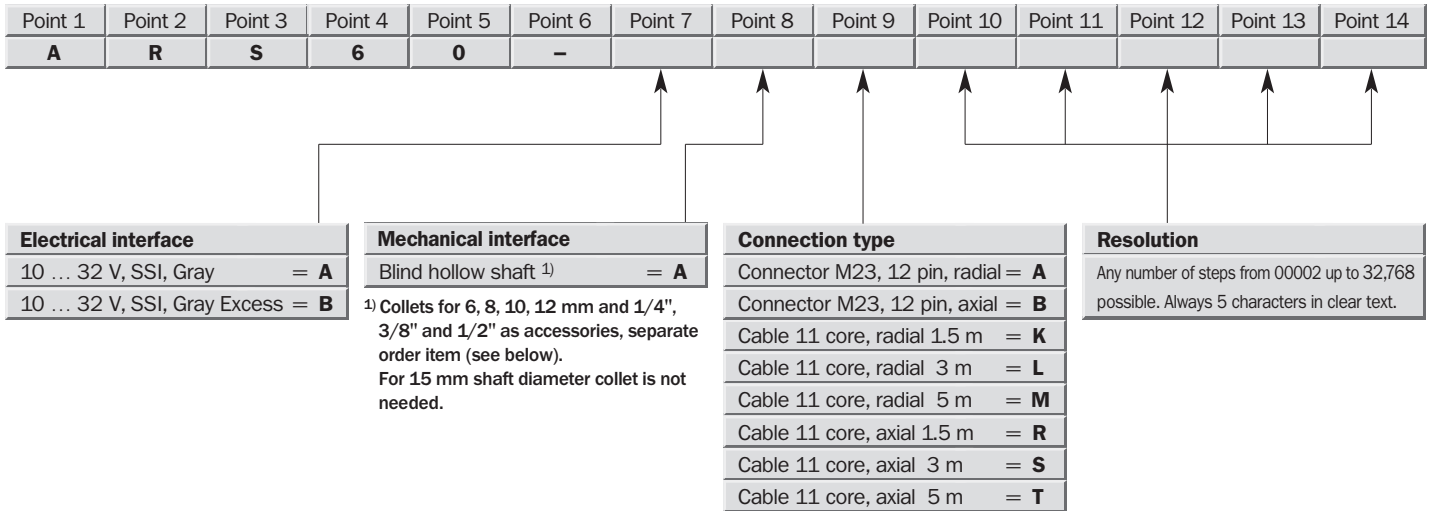
4) To DIN EN 61000-6-2 and DIN EN 61000-6-3  
 5) To DIN EN 60068-2-27  
 6) To DIN EN 60068-2-6  
 7) With mating connector fitted  
 8) Only with shaft stationary (note initialisation time)



Order information see pages 60/61

## Order information SSI Interface

### Absolute Encoder Singleturn ARS 60 SSI, blind hollow shaft



### Order example: Absolute Encoder Singleturn ARS 60 SSI

**10 ... 32 V, SSI, Gray; blind hollow shaft; connector M23, 12 pin, radial; number of steps 8,192**

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>	<b>A</b>	<b>A</b>	<b>A</b>	<b>0</b>	<b>8</b>	<b>1</b>	<b>9</b>	<b>2</b>

### Please enter your individual encoder here

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>								

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>								

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>								

### Collets for blind hollow shaft encoder

Type	Part no.	Shaft diameter
SPZ-006-AD-A	2 029 174	6 mm
SPZ-1E4-AD-A	2 029 175	1/4"
SPZ-008-AD-A	2 029 176	8 mm
SPZ-3E8-AD-A	2 029 177	3/8"
SPZ-010-AD-A	2 029 178	10 mm
SPZ-012-AD-A	2 029 179	12 mm
SPZ-1E2-AD-A	2 029 180	1/2"

**Order information Parallel Interface**

**Absolute Encoder Singleturn ARS 60 Parallel, blind hollow shaft**

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>								

<p><b>Electrical interface</b></p> <p>10 ... 32 V, parallel, Gray = <b>F</b></p> <p>10 ... 32 V, parallel, Gray Exc. = <b>G</b></p> <p>10 ... 32 V, parallel, BIN = <b>H</b></p> <p>10 ... 32 V, parallel, BCD = <b>J</b></p>	<p><b>Mechanical interface</b></p> <p>Blind hollow shaft <sup>1)</sup> = <b>A</b></p> <p><small><sup>1)</sup> Collets for 6, 8, 10, 12 mm and 1/4", 3/8" and 1/2" as accessories, separate order item (see below). For 15 mm shaft diameter collet is not needed.</small></p>	<p><b>Connection type</b></p> <p>Connector M23, 21 pin, radial = <b>A</b></p> <p>Connector M23, 21 pin, axial = <b>B</b></p> <p>Cable 22 core, radial 1.5 m = <b>K</b></p> <p>Cable 22 core, radial 3 m = <b>L</b></p> <p>Cable 22 core, radial 5 m = <b>M</b></p> <p>Cable 22 core, axial 1.5 m = <b>R</b></p> <p>Cable 22 core, axial 3 m = <b>S</b></p> <p>Cable 22 core, axial 5 m = <b>T</b></p>	<p><b>Resolution</b></p> <p>Any number of steps from 00002 up to 32,768 possible, with the following electrical interfaces:</p> <p>10 ... 32 V, parallel, Gray</p> <p>10 ... 32 V, parallel, Gray Excess</p> <p>10 ... 32 V, parallel, BIN</p> <p>Number of steps from 00002 up to 07999 possible, with the electrical interface:</p> <p>10 ... 32 V, parallel, BCD</p> <p>Always 5 characters, in clear text.</p>
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**Order example: Absolute Encoder Singleturn ARS 60 Parallel**

**10 ... 32 V, Parallel, Gray; blind hollow shaft; connector M23, 21 pin, radial; number of steps 8,192**

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>	<b>F</b>	<b>A</b>	<b>A</b>	<b>0</b>	<b>8</b>	<b>1</b>	<b>9</b>	<b>2</b>

**Please enter your individual encoder here**

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>								


Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>								

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>								

**Collets for blind hollow shaft encoder**

Type	Part no.	Shaft diameter
SPZ-006-AD-A	2 029 174	6 mm
SPZ-1E4-AD-A	2 029 175	1/4"
SPZ-008-AD-A	2 029 176	8 mm
SPZ-3E8-AD-A	2 029 177	3/8"
SPZ-010-AD-A	2 029 178	10 mm
SPZ-012-AD-A	2 029 179	12 mm
SPZ-1E2-AD-A	2 029 180	1/2"

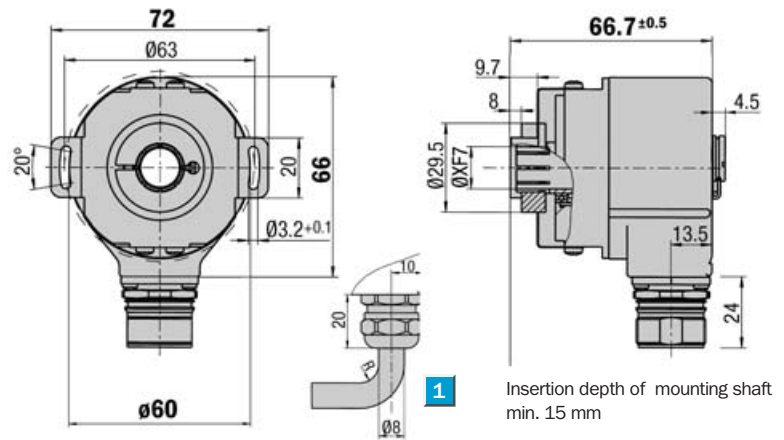


 **Number of steps**  
**2 to 32,768**

Absolute Encoder Singleturn

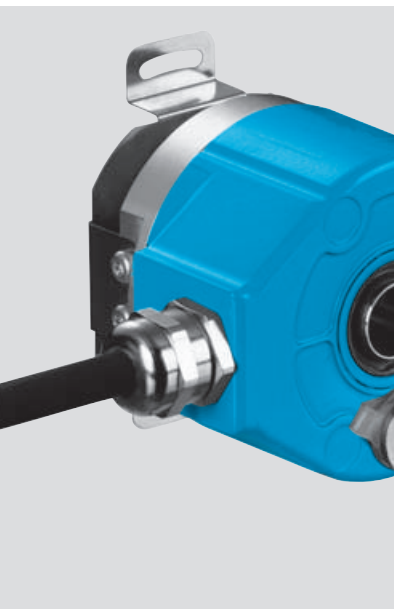
- Connector or cable outlet
- Protection class up to IP 64
- Electrical Interfaces  
SSI or Parallel
- Zero adjustment directly on  
the encoder or via a remote line

Dimensional drawing through hollow shaft, radial exit

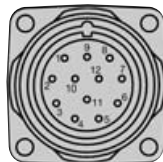


1 R = bending radius min. 40 mm

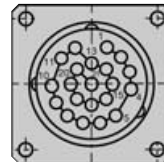
General tolerances according to DIN ISO 2768-mk



PIN and wire allocation see page 66



View of the connector M23 fitted to the encoder body SSI



View of the connector M23 fitted to the encoder body Single, Parallel

See chapter Accessories  
Accessories for encoders

Connection type

Radial cable

Radial connector



Technical Data acc. to DIN 32878		ARS 60 through hollow shaft										Flange type									
		through																			
<b>Hollow shaft diameter</b>	6, 8, 10, 12 mm, 1/4", 3/8", 1/2"																				
<b>Number of steps per revolution</b>	00002 ... 32,768, see ordering information																				
<b>Electrical interfaces</b>	SSI or Parallel																				
<b>Mass <sup>4)</sup></b>	Approx. 0.3 kg																				
<b>Moment of inertia of the rotor</b>	See Fig. 1																				
<b>Code direction <sup>2)</sup></b>	CW																				
<b>Measurement range</b>	1 revolution																				
<b>Measuring step</b>	360°/number of steps																				
<b>Repeatability</b>	0.005°																				
<b>Error limits</b>																					
binary number of steps	0.035°																				
non-binary number of steps	0.046°																				
<b>Measuring step deviation</b>																					
binary number of steps	0.005°																				
non-binary number of steps	0.016°																				
<b>Measured value backlash</b>	0.005°																				
<b>Response threshold</b>	0.003°																				
<b>Max. angular acceleration</b>	5 x 10 <sup>5</sup> rad/s <sup>2</sup>																				
<b>Max. operating speed</b>	3,000 min <sup>-1</sup>																				
<b>Operating torque</b>	Typ. 1.6 Ncm																				
<b>Start up torque</b>	Typ. 2.2 Ncm																				
<b>Permissible movement of the drive element</b>																					
radial movement static/dynamic	± 0.3/± 0.1 mm																				
axial movement static/dynamic	± 0.5/± 0.2 mm																				
<b>Bearing lifetime</b>	3.6 x 10 <sup>9</sup> revolutions																				
<b>Working temperature range</b>	- 20 ... + 85 °C																				
<b>Storage temperature range</b>	- 40 ... + 100 °C																				
<b>Permissible relative humidity <sup>3)</sup></b>	90 %																				
<b>EMC <sup>4)</sup></b>																					
<b>Resistance</b>																					
to shocks <sup>5)</sup>	50/11 g/ms																				
to vibration <sup>6)</sup>	20/10 ... 2000 g/Hz																				
<b>Protection class acc. IEC 60529</b>																					
connector outlet <sup>7)</sup>	IP 64																				
cable outlet	IP 64																				
<b>Operating voltage range (U<sub>s</sub>)</b>	10 ... 32 V																				
<b>Operating current</b>																					
SSI	Typ. 60 mA																				
Parallel	Typ. 90 mA																				
<b>Switching level of the control inputs</b>																					
	Logic H = 0.7 x U <sub>s</sub>																				
	Logic L = 0 V ... 0.3 x U <sub>s</sub>																				
<b>Operation of zero-set <sup>8)</sup></b>	≥ 100 ms																				
<b>Initialisation time after power on</b>	40 ms																				

<sup>1)</sup> For an encoder with connector outlet

<sup>2)</sup> Increasing when viewing the clockwise rotating shaft

<sup>3)</sup> Condensation not permitted

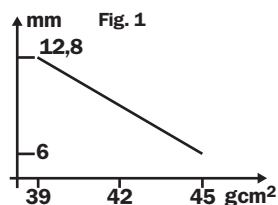
<sup>4)</sup> To DIN EN 61000-6-2 and DIN EN 61000-6-3

<sup>5)</sup> To DIN EN 60068-2-27

<sup>6)</sup> To DIN EN 60068-2-6

<sup>7)</sup> With mating connector fitted

<sup>8)</sup> Only with shaft stationary (note initialisation time)



## Order information SSI Interface

### Absolute Encoder Singleturn ARS 60 SSI, through hollow shaft

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>								

<b>Electrical interface</b>	<b>Mechanical interface</b>	<b>Connection type</b>	<b>Resolution</b>
10 ... 32 V, SSI, Gray = <b>A</b>	Through hollow shaft <sup>1)</sup> = <b>D</b>	Connector M23, 12 pin, radial = <b>A</b>	Any number of steps from 00002 up to 32,768 possible. Always 5 characters in clear text.
10 ... 32 V, SSI, Gray Excess = <b>B</b>	<sup>1)</sup> Collets for 6, 8, 10, 12 mm and 1/4", 3/8" and 1/2" as accessories, separate order item (see below).	Cable 11 core, radial 1.5 m = <b>K</b>	
		Cable 11 core, radial 3 m = <b>L</b>	
		Cable 11 core, radial 5 m = <b>M</b>	

### Order example: Absolute Encoder Singleturn ARS 60 SSI

**10 ... 32 V, SSI, Gray; through hollow shaft; connector M23, 12 pin, radial; number of steps 8,192**

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>	<b>A</b>	<b>D</b>	<b>A</b>	<b>0</b>	<b>8</b>	<b>1</b>	<b>9</b>	<b>2</b>

### Please enter your individual encoder here

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>								

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>								

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>								

### Collets for blind hollow shaft encoder

Type	Part no.	Shaft diameter
SPZ-006-AD-D	2 029 192	6 mm
SPZ-1E4-AD-D	2 029 193	1/4"
SPZ-008-AD-D	2 029 194	8 mm
SPZ-3E8-AD-D	2 029 195	3/8"
SPZ-010-AD-D	2 029 196	10 mm
SPZ-012-AD-D	2 029 197	12 mm
SPZ-1E2-AD-D	2 029 198	1/2"

**Order information Parallel Interface**

**Absolute Encoder Singleturn ARS 60 Parallel, through hollow shaft**

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>								

<b>Electrical interface</b> 10 ... 32 V, parallel, Gray = <b>F</b> 10 ... 32 V, parallel, Gray Exc. = <b>G</b> 10 ... 32 V, parallel, BIN = <b>H</b> 10 ... 32 V, parallel, BCD = <b>J</b>	<b>Mechanical interface</b> Through hollow shaft <sup>1)</sup> = <b>D</b> <small><sup>1)</sup> Collets for 6, 8, 10, 12 mm and 1/4", 3/8" and 1/2" as accessories, separate order item (see below).</small>	<b>Connection type</b> Connector M23, 21 pin, radial = <b>A</b> Cable 22 core, radial 1.5 m = <b>K</b> Cable 22 core, radial 3 m = <b>L</b> Cable 22 core, radial 5 m = <b>M</b>	<b>Resolution</b> Any number of steps from 00002 up to 32,768 possible, with the following electrical interfaces: 10 ... 32 V, parallel, Gray 10 ... 32 V, parallel, Gray Excess 10 ... 32 V, parallel, BIN  Number of steps from 00002 up to 07999 possible, with the electrical interface: 10 ... 32 V, parallel, BCD Always 5 characters, in clear text.
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**Order example: Absolute Encoder Singleturn ARS 60 Parallel**

**10 ... 32 V, Parallel, Gray; through hollow shaft; connector M23, 21 pin, radial; number of steps 8,192**

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>	<b>F</b>	<b>D</b>	<b>A</b>	<b>0</b>	<b>8</b>	<b>1</b>	<b>9</b>	<b>2</b>

**Please enter your individual encoder here**

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>								

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>								

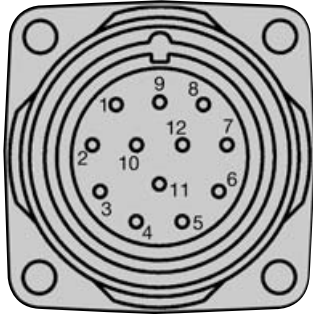
Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
<b>A</b>	<b>R</b>	<b>S</b>	<b>6</b>	<b>0</b>	<b>-</b>								

**Collets for blind hollow shaft encoder**

Type	Part no.	Shaft diameter
SPZ-006-AD-D	2 029 192	6 mm
SPZ-1E4-AD-D	2 029 193	1/4"
SPZ-008-AD-D	2 029 194	8 mm
SPZ-3E8-AD-D	2 029 195	3/8"
SPZ-010-AD-D	2 029 196	10 mm
SPZ-012-AD-D	2 029 197	12 mm
SPZ-1E2-AD-D	2 029 198	1/2"

## PIN and wire allocation

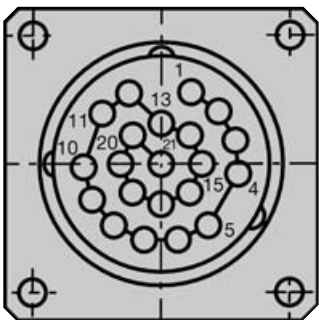
### Allocation for encoder with 12 pin connector; SSI Interface



View of the connector M23 fitted to the encoder body SSI

Signal	12-pin connector	11-core cable outlet
GND	1	blue
Data (+)	2	white
Clock (+)	3	yellow
N. C.	4	–
CW/CCW	5	pink
N. C.	6	–
N. C.	7	–
U <sub>s</sub>	8	red
SET	9	orange
Data (-)	10	brown
Clock (-)	11	violet
N. C.	12	–

### Allocation for encoder with 21 pin connector Single; Parallel Interface



View of the connector M23 fitted to the encoder body Single, Parallel

PIN	Wire colour by cable outlet	Binary	Gray	BCD	Explanation
1	violet	2 <sup>0</sup>	G <sub>0</sub>	2 <sup>0</sup> v.10 <sup>0</sup>	Data lines, outputs
2	white/brown	2 <sup>1</sup>	G <sub>1</sub>	2 <sup>1</sup> v.10 <sup>0</sup>	
3	white/green	2 <sup>2</sup>	G <sub>2</sub>	2 <sup>2</sup> v.10 <sup>0</sup>	
4	white/yellow	2 <sup>3</sup>	G <sub>3</sub>	2 <sup>3</sup> v.10 <sup>0</sup>	
5	white/grey	2 <sup>4</sup>	G <sub>4</sub>	2 <sup>0</sup> v.10 <sup>1</sup>	
6	white/pink	2 <sup>5</sup>	G <sub>5</sub>	2 <sup>1</sup> v.10 <sup>1</sup>	
7	white/blue	2 <sup>6</sup>	G <sub>6</sub>	2 <sup>2</sup> v.10 <sup>1</sup>	
8	white/red	2 <sup>7</sup>	G <sub>7</sub>	2 <sup>3</sup> v.10 <sup>1</sup>	
9	white/black	2 <sup>8</sup>	G <sub>8</sub>	2 <sup>0</sup> v.10 <sup>2</sup>	
10	brown/green	2 <sup>9</sup>	G <sub>9</sub>	2 <sup>1</sup> v.10 <sup>2</sup>	
11	brown/yellow	2 <sup>10</sup>	G <sub>10</sub>	2 <sup>2</sup> v.10 <sup>2</sup>	
12	brown/grey	2 <sup>11</sup>	G <sub>11</sub>	2 <sup>3</sup> v.10 <sup>2</sup>	
13	brown/pink	2 <sup>12</sup>	G <sub>12</sub>	2 <sup>0</sup> v.10 <sup>3</sup>	
14	brown/blue	2 <sup>13</sup>	G <sub>13</sub>	2 <sup>1</sup> v.10 <sup>3</sup>	
15	brown/red	2 <sup>14</sup>	G <sub>14</sub>	2 <sup>2</sup> v.10 <sup>3</sup>	
16	green	Parity	Parity	Parity	
17	pink	Store <sub>-</sub>	Store <sub>-</sub>	Store <sub>-</sub>	
18	yellow	Enable <sub>-</sub>	Enable <sub>-</sub>	Enable <sub>-</sub>	
19	brown	CW/CCW <sub>-</sub>	CW/CCW <sub>-</sub>	CW/CCW <sub>-</sub>	
*)	grey	SET	SET	SET	
20	blue	GND	GND	GND	
21	red	U <sub>s</sub>	U <sub>s</sub>	U <sub>s</sub>	
Housing		Screen	Screen	Screen	

\* Set line only possible with a cable outlet

U <sub>s</sub>	Supply voltage to the encoder (before commissioning, note must be taken of the type label of the encoder).	Enable <sub>-</sub>	This input activates the data output driver when a »LOW« level is applied. If not connected, this input is »LOW«. In the case of a »HIGH« level, the outputs are in the tristate mode.
GND	Zero volt connection to the encoder: electrically isolated from the housing. The voltage referred to GND is U <sub>s</sub> .	Store <sub>-</sub>	This input stores the encoder data in Gray code when a »LOW« level is applied. This avoids a read error if the output data list requested in binary code. If this input is »LOW«, the data at the encoder output is stable, irrespective of whether the input shaft rotates. If not switched, this input is »HIGH«.
CW/CCW <sub>-</sub>	Forward/reverse: this input programs the counting direction of the encoder. If not connected, this input is »HIGH«. If the encoder shaft, as viewed on the drive shaft, rotates in the clockwise direction, it counts in an increasing sequence. If it should count upwards when the shaft rotates in the anti-clockwise direction, this connection must be connected permanently to »LOW« level (zero volts).	Parity	This output supplies a »HIGH« level when the binary checksum of the data bits is even.
		SET	This input serves to set the zero electronically. If the SET line is connected to U <sub>s</sub> for more than 100 ms, the mechanical position corresponds to the value 0.



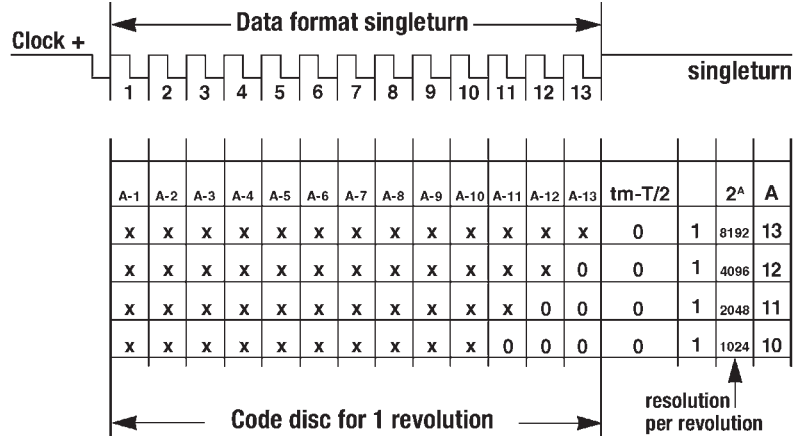
Signal outputs

SSI Data format for resolutions ≤ 8,192 (1-13 bits)

In order to be compatible with the data formats on the market, a distinction is made in the ARS 60 between two data formats.

The first data format applies to the encoder designs with resolutions up to 13 bits.

This is the standard data format for the singleturn absolute encoder.



SSI Data format for resolutions > 8,192 (14 and 15 bits)

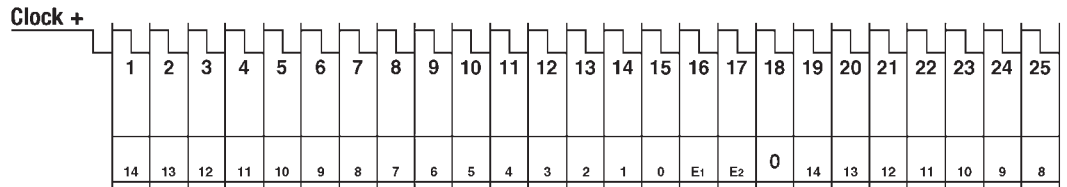
The data transmitted is left-justified. The 15 data bits are followed by two error bits.

**Error 1 (E<sub>1</sub>) = Position error**

During the determination of the position, an error has occurred since the last SSI transmission.

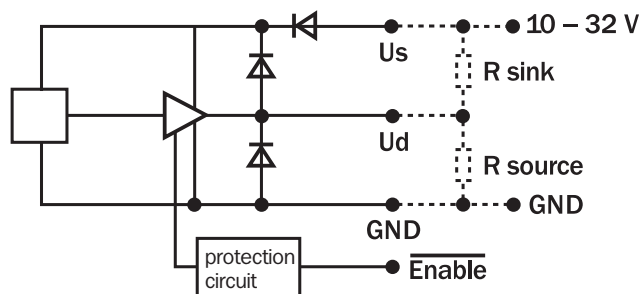
This error bit will be deleted during the next SSI transmission.

**Error 2 (E<sub>2</sub>) = light source monitoring**



Parallel Interface (Output driver 7272 push-pull)

- Tristate capability
- Short-circuit protected
- Protected against reverse polarity
- Integrated transient protection diodes



Technical Data: Parallel interface

<b>Id<sub>H</sub> max. at +85° C 8 nF 6000 min<sup>-1</sup></b>			30 mA
<b>Id<sub>L</sub> max. at +85° C 8 nF 6000 min<sup>-1</sup></b>			30 mA
<b>Output saturation voltage (H-level)</b>	to Id <sub>H</sub>	10 mA	2.8 V
U <sub>S</sub> -U <sub>dH</sub>		30 mA	3.0 V
<b>Output saturation voltage (L-level)</b>	to Id <sub>L</sub>	10 mA	0.4 V
U <sub>dL</sub>		30 mA	2.0 V
<b>Position refresh time</b> (dependent upon the encoder resolution and output code)	Parallel Gray-Code		60 μs
	Parallel BIN-Code		60 μs
	Parallel BCD-Code		200 μs